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Vol. 12

FEBRUARY 1961

No. 2

METEOROLOGICAL AND GEOASTROPHYSICAL ABSTRACTS

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MALCOLM RIGBY, Editor

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Special Feature in This Issue

Annotated Bibliography on Physics of Auroras

By

Andrew J. Meglis

(For table of contents see back cover)

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SELECT LIST OF PERIODICALS

Note: This list contains the titles of the periodicals which regularly contain material on meteorology or geophysics and it comprises only a small percentage of the periodicals from which pertinent articles are abstracted. The form of serial entry adopted is given in bold face type below.

- Acta Geophysica Polonica, [Warsaw].
- Acta Meteorologica Sinica, [Peking].
- Akademii Nauk SSSR, Izvestiia, Ser. Geogr. and Ser. Geofiz., [Moscow].
- American Geophysical Union, Transactions, [Washington].
- American Meteorological Society, Bulletin, [Boston].
- Angewandte Meteorologie, [Potsdam].
- Annales de Géophysique, Centre National de la Recherche Scientifique, [Paris].
- Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A and Ser. B, [Vienna].
- Australian Journal of Physics, [Melbourne].
- Beiträge zur Physik der Atmosphäre, [Frankfurt a. Main].
- Ciel et Terre, Société Belge d'Astronomie, Météorologie et Physique du Globe, [Brussels].
- Geofisica e Meteorologia, Società Italiana di Geofisica, [Genoa].
- Geofisica Pura e Applicata, Istituto Geofisico Italiano, [Milan].
- Geophysical Magazine, Japan Meteorological Agency, [Tokyo].
- Hemel en Dampkring, [The Hague].
- Időjárás, Magyar Meteorológiai Társaság and Országos Meteorológiai Intézet, [Budapest].
- Indian Journal of Meteorology and Geophysics, [Delhi].
- Journal de Mécanique et de Physique de l'Atmosphère, Société Météorologique de France.
- Journal of Atmospheric and Terrestrial Physics, [London].
- Journal of Geophysical Research, [Washington].
- Journal of Meteorological Research, [Tokyo].
- Journal of Meteorology, American Meteorological Society, [Boston].
- The Marine Observer, Air Ministry, Meteorological Office, London.
- The Meteorological Magazine, Air Ministry, Meteorological Office, London.
- Meteorologické Zprávy [Prague].
- Meteorological Society of Japan, Journal, [Tokyo].
- La Météorologie, Société Météorologique de France, [Paris].
- Meteorologii i Gidrologii, [Leningrad].
- Meteorologische Rundschau, [Berlin].
- Monthly Weather Review, U. S. Weather Bureau, Washington, D. C.
- Polarforschung, Archiv für Polarforschung, [Kiel].
- Przegląd Geofizyczny, [Warsaw].
- Revista de Geofísica, Instituto Nacional de Geofísica, [Madrid].
- Rivista di Meteorologia Aeronautica, Servizio Meteorologico, [Rome].
- Royal Meteorological Society, Quarterly Journal, [London].
- South Africa, Weather Bureau, Notes, [Pretoria].
- Tellus, Svenska Geofysiska Föreningen, Stockholm.
- Vsesoiuznoe Geograficheskoe Obshchestvo, SSSR, Izvestiia, [Leningrad].
- Weather, Royal Meteorological Society, [London].
- Weatherwise, American Meteorological Society, [Boston].
- Wetter und Leben, Österreichische Gesellschaft für Meteorologie, [Vienna].
- WMO Bulletin, World Meteorological Organization, [Geneva].
- Zeitschrift für Meteorologie, Meteorologisches Observatorium, Potsdam.

FOREWORD

Meteorological and Geostrophysical Abstracts is a monthly publication devoted to current literature in meteorology, geophysics and astrophysics.

Part I contains abstracts of current literature in the fields of meteorology, etc.

Part II of each issue comprises an annotated bibliography of important references on a special subject. Bibliographies published in the successive issues were:

Vol. I, 1950

- | | | | |
|---------------------|-------------------------|--------------------|------------------|
| 1. Atmos. Pollution | 2. Aerobiology | 3. Cloud Physics | 4. Hail |
| 5. Tornadoes | 6. Volcanic Dust | 7. Climat. Changes | 8. Thunderstorms |
| 9. Icing | 10. Acoust. Propagation | 11. Evaporation | |

Vol. II, 1951

- | | | | |
|------------------------|---------------------------|-------------------|------------------------|
| 1. Extended Forecast. | 2. Long Range Forecast. | 3. Soil Temp. | 4. Constants, etc. |
| 5. Clim. of Near East | 6. Clim. of Middle East | 7. Special Winds | 8. Radar Storm Detect. |
| 9. Condensation Trails | 10. Clim. of N. E. Africa | 11. Mountain Met. | |

Vol. III, 1952

- | | | | |
|--------------------------|----------------------|-----------------------------|-----------------------|
| 1. Clim. of N. W. Africa | 2. Carbon Dioxide | 3. Clim. of Argentina, etc. | 4. Dew |
| 5. Objective Forecast. | 6. Stratus Forecast. | 7. Urban Climatology | 8. Clim. of C. Africa |
| 9. Visibility | 10. Glaze and Rime | 11. Free Air Turbulence | |

Vol. IV, 1953

- | | | | |
|----------------------|--------------------------|---------------|-----------------------------|
| 1. Turbulence Theory | 2. Turbulent Diffusion | 3. Frost | 4. Clim. of Australia, etc. |
| 5. High Level Winds | 6. Winds in Stratosphere | 7. Jet Stream | 8. Radiation Bioclim. |
| 9. Clim. of Pacific | 10. Auroras | 11. Sferics | |

Vol. V, 1954

- | | | | |
|--------------------|------------------------|--------------------------|--------------------|
| 1. Oceanog. Met. | 2. Clim. of S. E. Asia | 3. Auroral Physics | 4. Tropopause |
| 5. Balloons | 6. Numerical Forecast. | 7. Radiation Data | 8. Vertical Motion |
| 9. Clim. of Arctic | 10. Industrial Met. | 11. Wind Waves and Swell | |

Vol. VI, 1955

- | | | |
|-------------------------|------------------------------|--------------------------|
| 1. Bibliog. of Bibliog. | 2. Texts & Monogr. Bibliogs. | 3. Storm Surges |
| 4. Ionospheric Prop. | 5. Photochem.—Upper Atmos. | 6. Cloud Physics |
| 7. Radar Cloud Physics | 8-9. Atmos. Nuclei | 10. Weather Modification |
| | | 11. Cooling Power |

Vol. VII, 1956

- | | | |
|--------------------------|-----------------------------|-------------------------|
| 1. Synoptic Met.-Arctic | 2. Clim. of Enclosed Spaces | 3. Cosmic Rays (-1952) |
| 4. Cosmic Rays (1953-56) | 5. Atmos. Radioactivity | 6. Inversions |
| 7. Snow Micromet. | 8. Snow Micromet. (Suppl.) | 9-11. Tropical Cyclones |

Vol. VIII, 1957

- | | | |
|----------------------------|--------------------------|---------------------------------|
| 1. Solar Weather Relations | 2. Night Airglow | 3. Forecasting Special Elements |
| 4. Forest Micrometeorology | 5. Hydromet. Forecasting | 6. Numerical Forecast. (Suppl.) |
| 7. Albedo | 8. Meteors | 9-10. Tropospheric Prop. |
| | | 11. Medical Meteorology |

Vol. IX, 1958

- | | | |
|-------------------------|-----------------------|--------------------------------|
| 1. Radioastronomy | 2. Solar Astrophysics | 3. Radioactivity in Atmosphere |
| 4. Waves and Currents | 5. Physical Oceanog. | 6. Dynamic & Phys. Oceanog. |
| 7. Long Range Forecast. | 8. Radar Met. | 9. Cosmic Rays |
| | | 10-11. Geomagnetism |

Vol. X, 1959

- | | | | |
|-------------------------------|------------------------------------|----------------------------|------------|
| 1. Works of C. E. P. Brooks | 2. Tornado Forecasting | 3. Soil Moisture | 4. Sferics |
| 5-6. Ozone | 7. Acoustic Waves | 8. Evaporation Measurement | |
| 9. Evapotranspiration (-1955) | 10. Evapotranspiration (1956-1959) | 11. Evaporation | |

Vol. XI, 1960

- | | | |
|--------------------------------|----------------------------|---------------------------------|
| 1. Outstanding Reference Works | 2. Outstanding Texts | 3. Numerical Forecast. (Suppl.) |
| 4. Ionospheric Physics | 5. Ionospheric Propagation | 6. Ionosphere |
| 7. Forecast Verification | 8. Radar Meteorology | 9. Rocket Meteorology |
| 10. Satellite Meteorology | 11. Airglow | |

Bibliographies in preparation or published in Vol. XII

<i>Aurora</i> (No. 1)	<i>Limnology</i> (No. 3)	<i>Physics of Lightning</i>
<i>Auroral Physics</i> (No. 2)	<i>Upper Atmosphere Structure</i> (No. 4, 5 and 6)	<i>Precipitation Chemistry</i>

Part III contains a listing of reviews, translations, reprints, and the contents of important publications. These are published in the earliest issue where space permits.

Part IV is made up of author, subject and geographical indexes.

EXPLANATIONS

Location of material: For each entry, a symbol is given for at least one library where the material may be found. The Union List of Serials (Gregory) is the source of most of the symbols used. In some cases, where no symbol has been assigned to a library, one will be devised according to the principles of the Union List.

Library symbols used frequently may be found in the following list:

DA:	U. S. Dept. of Agriculture Library, Washington, D. C.
DBS:	U. S. Bureau of Standards Library, Washington, D. C.
DGS:	U. S. Geological Survey Library, Washington, D. C.
DLC:	Library of Congress, Washington, D. C.
DN-HO:	U. S. Navy Hydrographic Office Library, Suitland, Md.
DNLM:	U. S. National Library of Medicine, Washington, D. C.
DSI:	Smithsonian Institution, Washington, D. C.
DWB:	U. S. Weather Bureau Library, Washington, D. C.

Other symbols:

*	before an entry indicates a good data source.
†	before an entry indicates a good bibliography.
§	before an entry indicates a synoptic case history study accompanied by charts.
⊙	after an abstract indicates an abstract prepared for NASA.

Geographic locations are in the English form rather than the form used locally, for example, Moscow for Moskva.

Titles of articles or monographs are in the language of the original article unless otherwise stated. Slavic (Cyrillic) titles are transliterated into the Roman alphabet using a modification of the Library of Congress transliteration scheme.

Abbreviations:

Titles of periodicals are not abbreviated, as a rule.

The months of the year from March to July are not abbreviated. Other months are abbreviated as Jan., Feb., Aug., Sept., Oct., Nov., and Dec.

The word or abbreviation for Volume (Tom, Band, Jahrgang, Año, etc.), for Number (Heft, Fascicule, Vypusk, etc.) and for page or pages is omitted from most entries. Thus an entry will read as follows:

Meteorologische Rundschau, 2(5/6):146-151, May/June 1950.

This indicates that the article appeared in *Meteorologische Rundschau*, Jahrgang 2 (Vol. 2), Heft 5/6 (No. 5/6), pages 146-151, May/June 1950.

PART I. ABSTRACTS OF CURRENT METEOROLOGICAL AND GEOASTROPHYSICAL MATERIAL

A. GENERAL

A1. TEXTBOOKS

12.2-1

551.46(02)

Plakhotnik, Aleksandr Filippovich, *Okeany i moria: posobie dlia uchitelei*. [Oceans and seas: a textbook.] Moscow, Gos. Uchebno-Pedagog. Izd-vo, 1959. 181 p. maps (some fold.). DLC (GC15.P55)—A high school level textbook giving the basic facts about the physical and economic geography of the several oceans and seas of the world. Ch. I gives the general facts about the oceans, currents, relief, chemistry, ice, density, optics, tides, waves, IGY expeditions, etc. Ch. III-VII give details of the Pacific and its bordering seas and the history of exploration and oceanographic surveys therein: the Atlantic and its seas, the Indian Ocean, the Antarctic waters of the Pacific, Atlantic and Indian Ocean, the Arctic Ocean and seas and, finally, the Caspian and Aral Seas. Emphasis is placed on the exploration and investigations of Russian, and especially Soviet marine geographers. *Subject Heading: 1. Oceanography textbooks.*—M.R.

A2. ATLASES

12.2-2

551.582.3(54)

India. Ministry of Education and Scientific Research, *National atlas of India* (preliminary edition). Ed. by S. P. Chatterjee. Maps prepared by the National Atlas Organization of the Government of India. Printed Calcutta, Survey of India Offices, 1957. Looseleaf Title-page in Hindi and English. 26 plates in multicolor (double page size 32×40 cm), containing 21 maps on scale 1:5,000,000; 16 on scale 1:10,000,000, plus numerous other inset maps on various scales. English version of legends and explanatory notes for each map. Separate map in black and white gives boundaries of reorganized states, with place names in English. Measurements in metric system. Available for reference only. DWB (oversize 915.4 134na). Review by S. K. Ghose in *Indian Journal of Meteorology and Geophysics*, 10(1):110-111, Jan. 1959. Review by L. Dudley Stamp in *Geographical Journal*, London, 125(1):96-97, March 1959. Price for popular edition 100 rupees. Individual sheets 5 Rs. (7s6d) and 3.5 Rs. for popular edition.—Chart No. 5 of the 26 maps in this ambitious atlas covers floods and runoff, No. 6, normal annual rainfall (lowest and highest); No. 7, Temperature and winds (lowest minimum, highest maximum, daily mean maximum in winter (Jan.) and frequency of wind directions (Jan.) and maximum in summer (May) and wind frequency (July). Climatic maps are based on records of 3000 stations. *Subject Headings: 1. National atlas of India 2. Climate maps of India 3. India. I. Chatterjee, S. P. (ed.) II. India. National Atlas Organization III. National Atlas of India.*—M.R.

A3. IGY—ARCTIC—ANTARCTIC

See also: IGY rocket soundings, 12.2-50; IGY seismology program (Rothé), 12.2-138; Rawinsonde balloon conditioning, Antarctica (Flowers, Hansen), 12.2-213.

12.2-3

551.506.22:551.510.53:551.510.41(99)

Miller, Lewis E. (GRD, U. S. Air Force Cambridge Research Center), *The International Geophysical Year, 1957/1958 and chemistry*. *Journal of Chemical Education*, Easton, Pa., 34:420-426, Sept. 1957. 5 figs., 2 tables, 9 refs. DLC (QD1.J93), DWB (551 M648in)—The

International Polar Years 1882-83 and 1932-33 gave birth to our present 1957-58 IGY. The report reiterates the purpose and scope of the organization but devotes most of its space to the discussion of the morphology of the upper atmosphere, the airglow and aurora, oceanography and glaciology as well as to ozone studies, the satellite project and the rocket exploration of the upper atmosphere. The chemistry of atmospheric oxygen in Antarctic air has revealed an average of 20-50% in summer and 20-64% in winter as opposed to the 20-95% observed everywhere else outside this region. Other projects to be carried out in the Antarctic zone is investigation of the chemistry of carbon dioxide, water vapor, the isotope-ratios of oxygen, hydrogen and other gases, as well as the radioactive constituents of ice deposits. *Subject Headings: 1. IGY program 2. Upper atmosphere chemistry.—N.N.*

12.2-4

550.3:061.3:551.506.22

Tsentral'nye organizatsii po provedeniiu Mezhdunarodnogo geofizicheskogo goda. [Central organizations responsible for the IGY program.] *Akademiia Nauk SSSR. Mezhdunarodnometvennyi Komitet po Provedeniiu Mezhdunarodnogo Geofizicheskogo Goda, Informatsionnyi Biulleten'*, No. 3:5-8, 1957. **DLC**—Russian translations of Circular 28-571/18 of the Special Committee for the IGY, listing the organizations (composition and functions) of central organizations responsible for the carrying out of the program of the IGY. *Subject Headings: 1. IGY program 2. CSAGI circulars.—A.M.P.*

12.2-5

550.385.43

World Warning Agency decisions, Jan. 1, 1958-June 30, 1958. *American Geophysical Union, Transactions*, 39(4):801-802, Aug. 1958. **DWB, DLC**—A list is given of the Alerts, SW1, geomagnetic disturbances, and the major flares that occurred from Jan. 1, 1958, to June 30, 1959 during the IGY. The Alerts and SW1 are numbered serially from Alert number 16, which ended on Dec. 29, 1957 and from SW1 number 7 which ended on Nov. 27, 1957. *Subject Headings: 1. Geomagnetic networks 2. Geomagnetic disturbances.—N.N.*

12.2-6

91.04(988) 551.506.5(988)

†Georgi, Johannes, **Nord-Grönland: die Forschungen der Britischen Nordgrönlandexpedition 1952-1954.** [North Greenland: investigations of the British North Greenland expedition, 1952-1954.] *Erdkunde*, Bonn, 12(1):51-61, Feb. 1958. 4 figs., refs. English summary p. 51. **DLC**—This account of the British North Greenland Expedition of 1952-1954 is based upon the report **North Ice** (London, 1957) published by COMMANDER C. J. W. SIMPSON and various other scientific reports which are listed. The planning, execution, and route of the expedition are described and an account is given of the extent of glaciological, microclimatic and meteorological observations. Some temperature measurements are given in the text and general descriptions of weather conditions are included. In anticipation of a German edition of SIMPSON's, the author offers criticisms of and suggestions for improving the book, including both the text and the maps. *Subject Headings: 1. British North Greenland Expedition, 1952-54 2. Weather conditions 3. North Greenland.—I.L.D.*

12.2-7

551.582(988)

Georgi, Johannes (Hamburg), **Das Klima des nordgrönlandischen Inlandeises.** [The climate of the North Greenland Ice Cap.] *Annalen der Meteorologie*, Hamburg, 8(9/10):259-263, 1959. 2 figs., 2 tables, 4 refs. English summary p. 259. "Supplement to his **Klima von Eismitte**" (see 6.11-320, Nov. 1955, *Met. Abstracts*). **DWB, DLC**—The climate of the inland ice-sheet of Greenland shown by means of the measurements of the British North Greenland Expedition 1952/54 (BNGE) and compared with those of "Eismitte" I-III (1930/31 and 1949/51). *Subject Headings: 1. Climate of North Greenland Ice Cap 2. North Greenland Ice Cap.—Author's abstract.*

12.2-8

551.501.9:551.507:551.326.7(98)

Untersteiner, N. (Central Agency for Met. & Geodynamics, Vienna), **Drifting Station A: eine schwimmende Station im Packeis des Nordpolarmeeres.** [Drifting Station A, a floating station in the ice pack of the Arctic Ocean.] *Umschau*, Frankfurt a.M., 59(13):385-389, July 1, 1959. 11 photos, map. **DLC**—Drifting Station A was established in 1957 in the pack

ice in connection with the IGY program in order to investigate the drift under the influence of wind and marine currents, heat balance of pack ice, to make geomagnetic and seismic measurements, etc. The author describes the technical operations for establishing the base, the camp including housing and working accommodations and some of the scientific work. The author investigated the heat balance of the pack ice by a quantitative analysis of the physical meteorological processes involved as in the formation and melting of sea ice. Radiation plays the most important role in the melting and cooling of ice; sensible and latent heat transformations are of minor significance. During winter the ice has a temperature gradient of $50^{\circ}\text{C}/3\text{ m}$ which results in a considerable heat flow from the ocean into the atmosphere. The heat balance finds its material expression in thickness changes or in the attainment of a stationary pack ice thickness. Since the summer ablation at the surface depends only slightly upon the ice thickness, but the winter freezing process at the bottom side recedes rapidly with the thickening of the ice, an equilibrium sets in after 4 or 5 years between summer ablation and winter freezing. In the central Arctic these "annual layers" are approximately 33 cm thick; stationary ice thicknesses are 300–350 cm. The compression and crevices occurring on the ice island with the beginning of the summer necessitating actual evacuation are described and the encounter with the atomic submarine "Skate" is related. *Subject Headings: 1. Drift ice meteorological stations 2. Heat balance of pack ice 3. Arctic.—I.L.D.*

12.2-9

551.501.9:551.507.2:551.326.7 551.321.62

Keller, G. V. (*U. S. Geological Survey*), *Geophysical investigations by the U. S. Geological Survey on T-3*. *U. S. Air Force. Cambridge Research Center, GRD Research Notes*, No. 15:26-30, April 1959. 2 figs. DWB—From May 1 to Oct. 10, 1958, when the T-3 station drifted from $80^{\circ}20'\text{N}$, $113^{\circ}20'\text{W}$ to $78^{\circ}10'\text{N}$, $122^{\circ}10'\text{W}$, seismic measurements of ocean depths and sub-bottom character were conducted. Depths varied from minimum 3000 to maximum 8000 ft. Details of structural features are given. Thickness of the drifting ice island was measured by an electromagnetic method which is better than the seismic method under Arctic working conditions. Thickness varied from 35 to 170 ft. The North American gravimeter was read twice daily. *Subject Headings: 1. Drift ice meteorological stations 2. Geophysical stations 3. Ice Island T-3 4. Arctic.—W.N.*

12.2-10

551.593.5:551.578.46:553

Fritz, Sigmund (*U. S. W. B., Wash., D. C.*), *On the Arctic Whiteout*. (In: *Polar Atmosphere Symposium*, Oslo, July 2-8, 1956, *Proceedings*, Pt. 1, *Meteorology Section*. N. Y., Pergamon Press, 1958. p. 182-186. 2 figs., 7 refs., 2 eqs.) Also issued in *Journal of Atmospheric and Terrestrial Physics*, London, Special Supplement, Pt. 1, 1957. p. 182-186. DWB, DLC—This phenomenon has also been described as "Milky weather," "White darkness" and "whiteout." A mathematical model is used here in an attempt to define the phenomenon as a function of luminance, uniformity of which decreases with decreased surface albedo. All values of the latter as derived from sky brightness can be computed. Two equations are formed and presented. The nadir is brighter than the horizon during "whiteout" and the difference is found to increase with decreasing surface albedo. *Subject Heading: 1. Arctic whiteout.—W.N.*

12.2-11

550.3:061.3:551.506.22(99)

Panzrini, Rodolfo N. (*Director, Institute*), *El Antártico en el Año Geofísico Internacional*. [The Antarctic in the International Geophysical Year.] *Instituto Antártico Argentino, Buenos Aires, Contribucion*, No. 17, 1959. 29 p. 7 figs., 2 refs. Summaries in Spanish, English, French, German and Italian p. 3. DWB (919.9 P199an). "Also pub. in *Anales de la Academia Argentina de Geografía*, No. 1, 1957."—The object and methods of geophysical research following H. U. SVERDRUP's line of thought are considered, and the aims, the organization and the program of the IGY, especially for the Antarctic, are described. *Subject Headings: 1. International Geophysical Year, 1957-1958 2. IGY Antarctic program.—Author's abstract.*

12.2-12

551.501.9(99)

Alt, Jean (*Météorologie Nationale, France*), *Mission dans l'Antarctique*. [Antarctic mission.] *France. Secrétariat Général à l'Aviation Civile, Revue*, No. 103:40-50, Jan. 15,

1960. chart, 5 photos.—An account of the creation, the aim and functioning of the Antarctic Weather Central, situated at Little America. As representative of France, the author participated in the work of this organization. In this article he discusses various subjects, particularly the organization and the functioning of Antarctic U. S. bases in Little America, where he spent most of his time. The article gives a short description of the transport material i.e., planes, ice-breakers, cargoes, polar vehicles. The author also throws light on the life of the personnel stationed at the base of Little America. *Subject Headings:* 1. Antarctic stations 2. Little America, Antarctica.—A.V.

12.2-13

551.55:551.524(99)

Schwerdtfeger, W. (*Met. Dept., Univ. of Melbourne*), *Comparison of the relation between surface wind speed and temperature in the southern parts of the Ross Sea and Weddell Sea. Australian Meteorological Magazine*, Melbourne, 23:51-54, Dec. 1958. fig., 3 tables. DWB—Over level ground in Antarctica wind speeds are generally directly proportional to temperatures because of the inversion influence. It is shown, however, that this does not apply in the case of southerly winds at stations in the southern part of the Weddell Sea area, where there is a strong Katabatic effect. *Subject Headings:* 1. Wind speed-temperature relationships 2. Antarctic winds 3. Antarctica.—*Author's abstract.*

12.2-14

551.506.5:551.582.1:551.324.3(99)

Le climat et les glaces de l'Antarctique. [Climate and ice in Antarctica.] *La Nature*, Paris, No. 3299:94, March 1960. table. DLC—Climatological and glaciological data of Antarctica taken from a booklet published by the Academy of Sciences of Moscow and entitled *Soviet Polar Expeditions*. The geographic co-ordinates of the three most important advanced stations are indicated. A table reproduces the mean and extreme temperatures observed at Vostok in 1958; in August 1958 $-87^{\circ}4$ was observed. This temperature seems to be the lowest ever observed on the globe. The unfavorable effect of the climate on man decreases as the human body gets acclimatized. The ice thickness varies according to the regions and ranges from 3.360 m to 750 m. *Subject Headings:* 1. Soviet polar expeditions 2. Climate of Antarctica 3. Extreme temperatures 4. Ice thickness 5. Antarctica.—A.V.

12.2-15

551.582.2(99) 551.586:612.014.4

Lepikhin, P. A., *V glubine Antarktity*. [In the interior of the Antarctic Continent.] *Priroda*, Moscow, No. 12:79-86, Dec. 1958. 3 photos. DLC—An account of physical conditions and life in the Soviet South Pole station Vostok-1 situated in the interior of Antarctica at $72^{\circ}09'S$ lat. and $96^{\circ}33'5''E$ long. at an altitude of 3380 m above sea level and 650 km south of Mirny. The author describes: 1. the course of the tractor sleds from Mirny to the inland station giving an account of surface conditions such as sastrugi and weather conditions including data on air temperature, precipitation and wind; 2. the physical outlay of the inland stations—temperature, precipitation, wind and snow cover characteristics, and auroral observations, etc. during 1957. Various means for facilitating life under the stress of Antarctic conditions, i.e., food provisions, and radio communication with the outside world, are also discussed. *Subject Headings:* 1. Climate of Antarctica 2. Cold region bioclimatology 3. Antarctica.—I.L.D.

12.2-16

551.593

George, D. J., *Some notes on optical phenomena in Antarctica. Meteorological Magazine*, London, 87(1036):289-294, Oct. 1958. fig., 5 refs. 3 plates facing p. 305. DWB—A collection of detailed notes made by the author in 1953 and 1954 at the South Shetland Islands bases 80-90 mi to the W and NW of Grahamland Peninsula (Deception Island, $63^{\circ}S$, $60\frac{1}{2}^{\circ}W$) and Admiralty Bay ($62^{\circ}S$, $58\frac{1}{2}^{\circ}W$) and on surveys down the west coast of Grahamland as far as $65^{\circ}S$ on the R.R.S. "John Biscoe." The notes cover observations of rainbows, fog-bows, broken spectra, mirages, coronas, iridescent clouds, haloes, parhelia, sun pillars and allied phenomena, twilight coloration and alpine glow. Three fine illustrations are provided by photographs of sun pillars and parhelia made by the author, by G. BROOKFIELD, and W. TURNER in Admiralty Bay and Grahamland. *Subject Headings:* 1. Optical phenomena in Antarctica 2. Grahamland, Antarctica.—M.R.

A4. SERVICES

See also: **German Marine Weather Service** (Seilkopf), 12.2-54; **Met. services** (Mancini), 12.2-55; **Hydrologic services, Bulgaria** (Ivanov), 12.2-171.

12.2-17

551.5:061.1:359.38(798)

Jorgensen, Paul T., **Naval Weather Service in Alaska**. *Weatherwise*, Boston, 11(5):172-173; 181, Oct. 1958. fig. **DWB**—Mean water temperature at 60°N in the Kodiak region of the Alaska Gulf is 40°F in January and 52°F in August. Cloud, fog and low ceilings, snow and precipitation are frequent and present real hazards to flying in the Aleutian area. The Navy Fleet Weather Central at Kodiak issues synopsis and forecasts of wind, sea and weather for the N. E. Pacific, the Gulf of Alaska and for navigable areas of the Arctic Ocean and storm warnings for U. S.-Oriental shipping and Alaskan coastal towns. It also provides flying weather information 24 hours a day. Patrols fly over Alaska, the Bering Sea and Arctic to report ice conditions and leads or channels for the U. S. Hydrographic Office. The Fleet Weather Central also has a part in photography and study of Alaskan glaciers. *Subject Headings*: 1. Alaskan Naval Weather Service 2. U. S. Naval Weather Service, Kodiak, Alaska 3. Kodiak, Alaska 4. Alaska.—*M.R.*

12.2-18

551.5:061.1(672)

Weisse, Léon, **Le Service Météorologique de l'Afrique Equatoriale Française**. [The meteorological service in French Equatorial Africa.] *France. Secrétariat Général à l'Aviation Civile, Revue*, No. 102:85-95, Oct. 15, 1959. 6 charts, 3 photos, 2 tables.—This article gives a short survey of the geographic and climatological conditions of French Equatorial Africa. It gives a historical account of meteorological observations and describes the present meteorological organization both from the administrative and from the technical point of view. Climatological charts indicating the distribution of extreme temperatures and mean precipitation in January and July are reproduced. *Subject Headings*: 1. Meteorological services 2. French Equatorial Africa.—*A.V.*

12.2-19

551.5:519.24

Kimball, George E. (*Arthur D. Little, Inc.*), **A critique of Operations Research**. *Washington Academy of Sciences, Journal*, 48(2):33-37, Feb. 1958. **DLC**—Operations Research was initiated during World War II when non-military personnel collaborated to solve operational problems and was extended after the war to industrial operations, or wherever complex relations exist between groups of men and machine systems and general principles governing these relations are sought. Wherever dissimilar situations have similar elements it is useful, but where operations are unique, it is not; nor is solution of specific problems "Operations Research" but the solution is only a by-product of "Operations Research." The several theories which enter into Operations Research are discussed, namely: congestion theory, warehousing theory, transportation theory, communications theory, production control theory, research theory, and population dynamics theory. *Subject Headings*: 1. Operations Research 2. Communications theories.—*M.R.*

12.2-20

551.501.9 551.509.34

Dursoko, Ted, **Private weather station**. *Flying*, N. Y., 61(2):54-55, 88-89, Aug. 1957. 2 figs. **DWB**—Author needed weather sequences within 200 mi radius from Northfield, Ohio for his flights. He set up his private weather station to make forecasts of frontal movement, which is discussed. *Subject Heading*: 1. Private weather services.—*W.N.*

12.2-21

621.397.9:551.509.2(079.2)

Jehn, K. H. (*Univ. of Texas*), **Recognition of competence in weathercasting—the AMS seal of approval program**. *American Meteorological Society, Bulletin*, 40(2):85-88, Feb. 1959. **DWB, DLC**—History of Committee on Radio and Television of the A.M.S. which began in 1954 (permanent committee was established in 1955), and Seal of Approval Program beginning in 1957-58 is outlined. Details of the program, sample evaluation form; criteria for issuance of the AMS seal of approval: 1) informational value; 2) audience interest; 3) educational value; 4) professional attitude; and, finally, procedure for application and certification are set forth.

Subject Headings: 1. Weather broadcasting improvement 2. Television weather broadcasts.—M.R.

12.2-22

551.5 5(47)

Wallace, Robert, **First hard facts on all Russian sciences.** *Life*, Chicago, 43(25):108-122, Dec. 16, 1957. photos. **DLC**—An appraisal of the strength and weakness of Soviet science in several fields—Mathematics, Physics, Geophysics (including Meteorology), Astronomy, etc. *Subject Heading:* 1. Soviet science.—M.R.

A5. CONFERENCES—SYMPOSIA

See also: Geophysical conf., 12.2-152; Hydrologic conf. (Lăzărescu), 12.2-162.

12.2-23

550.3:061.3

Magnitskii, V. A., **Mezhdunarodnyi kongress geofizikov na XI general'noi Assamblee Mezhdunarodnogo geodezicheskogo i gofizicheskogo soiuza v Kanade.** [International congress of geophysicists at the XI General Assembly of the I.U.G.G. in Canada.] *Priroda*, Moscow, 47(3):44-49, March 1958. 4 photos. **DLC**—The XI General Assembly of the I.U.G.G. held in Toronto in 1957 was attended by 44 Soviet geophysicists. In this article the author gives an account of the airplane trip from Moscow and impressions of Montreal and Toronto, a description of the University of Toronto as well as a summary of the proceedings of the scientific sessions of the congress. Particular stress is placed upon papers and activities of Soviet delegates. M. M. OBUKHOV and A. S. MONIN presented papers on atmospheric turbulence; M. N. KOSHIAKOV and V. B. KORT, respectively, discussed the circulation of the oceans and marine work of the Soviet Antarctic expedition. The Soviet delegation organized an exhibition of Soviet geophysical literature which was presented ultimately to the University of Toronto. *Subject Headings:* 1. I.U.G.G. General Assembly, 1957 2. Toronto, Canada.—I.L.D.

A6. EDUCATION—HISTORY—BIOGRAPHY—BIBLIOGRAPHY

HISTORY

See also: Hist. of astronautics (Ley), 12.2-49; Hist. of atmos. optics (Middleton), 12.2-418.

12.2-24

551.5(09):8

Dufour, Louis (*Royal Meteor. Inst. of Belgium*), **Les écrivains et la météorologie: Saint-Exupéry.** [Writers and meteorology: Saint-Exupéry.] *Ciel et Terre*, Brussels, 75(9/10):295-297, Sept./Oct. 1959. **DLC**—SAINT-EXUPÉRY, contemporary French writer, was an active air-line pilot. The author gives two descriptions of meteorological phenomena taken from the novels, **Vol de nuit** and **Terre des hommes**. The writer describes atmospheric phenomena only in so far as they interfere with the messages he sent. He is the first French writer who introduced meteorology into French literature. *Subject Headings:* 1. Meteorology in literature 2. Saint-Exupéry, Antoine de.—A.V.

BIOGRAPHY

12.2-25

551.511.33:92

Laureat Leninskoï premii. [Lenin prize laureate.] *Meteorologiya i Gidrologiya*, Leningrad, No. 7:65-66, July 1958. photo. **DWB, DLC**—M. I. BUDYKO, Director of A. S. Voeikov Central Geophysical Observatory, received the Lenin Prize for his scientific studies—**Heat balance of the earth's surface** (see 8.5-20) and **Atlas of heat balance** (see 8.5-19)—which were published during 1955-1956. The significance of BUDYKO's work on heat balance is pointed out. Special attention is called to the value of his work on agriculture, since he developed methods for measuring evaporation from fields. The method of heat balance has led to studies of various problems of physical geography: these include the formation of geographic zones over the entire earth's surface and the physical basis of geobotanic and soil zones. *Subject Headings:* 1. Heat balance of earth's surface 2. Biography of M. I. Budyko 3. Budyko, M. I.—I.L.D.

12.2-26

551.1:92

Gerasimov, I. P., **O roli Villiama Morrisa Devisa v razvitii sovremennoi geomorfologii.** [Role of William Morris Davis in contemporary geomorphology.] *Akademiia Nauk SSSR, Ser. Geograf.*, No. 1:122-127, Jan./Feb. 1956. 3 refs. **DLC**—A long critical review of the ideas of WILLIAM MORRIS DAVIS and their effect on geographers and geomorphologists in the U. S. and abroad, with special reference to the article by LOUIS C. PEITIER in *American Geography*; which the author claims does not do justice to DAVIS. *Subject Headings: 1. Geomorphology 2. Davis, William Morris.*—M.R.

12.2-27

551.5:63:92

Mel', M. I., **Pavel Ivanovich Koloskov: 70 let zhizni i 50 let nauchnoi deiatel'nosti.** [P. I. Koloskov, 70th anniversary and 50 years of scientific activity.] *Vsesoiuznoe Geograficheskoe Obshchestvo, Leningrad, Izvestiia*, 90(5):467-468, Sept./Oct. 1958. photo. **DLC**—A brief account of the scientific works of P. I. KOLOSKOV is presented. Beginning his scientific career as a weather observer he eventually organized the meteorological network of the Amur region and the Far East Territory and became the foremost authority on the climate of the Far East. Among his numerous climatological works may be mentioned **Klimaticheskije osnovy sel'skogo khozaistva v Amuvskoi gubernii** [Climate basis on the agriculture of the Amur province] and **Agroklimaticheskoe raionirovaniia v Kazakhstane** [Agroclimatic regions of Kazakhstan]. At present KOLOSKOV is working at the Scientific Research Institute for Aeroclimatology where he is in charge of work on the "Agroclimatic Regions of the U.S.S.R." *Subject Headings: 1. Biography of P. I. Koloskov 2. Koloskov, P. I.*—I.L.D.

12.2-28

550.34:92

†Hiller, W., **Im Memoriam Dr. Ernst Wanner.** *Zeitschrift für Geophysik*, Würzburg, 22(1):53-57, 1956. photo, bibliog. p. 55-57. **DLC** (QC801.Z4)—ERNST WANNER died suddenly in Zurich of a heart attack on Nov. 4, 1955 at the age of 56. He was born on July 22, 1900 in Zurich. Educated in Zurich as a mathematical physicist and work at both the Astronomical Observatory and the Central Met. Inst. in Zurich. He served as head of the Seismological Service for Switzerland, and was Vice Director of the Swiss Met. Service where he was in charge of personnel. He was President of the Swiss National Committee for I.U.G.G., Vice President of the International Association of Seismology and Physics of the Earth's Interior and a long term member of the German Geophysical Society. His bibliography consists of 56 items, mostly devoted to seismology and hydrometeorology or statistics. *Subject Headings: 1. Biography of Ernst Wanner 2. Wanner, Ernst 3. Seismological bibliography.*—M.R.

BIBLIOGRAPHY—TERMINOLOGY

See also: **Glaciology bibliographies** (Lorenzo), 12.2-179; **Met. terminology** (Rodewald), 12.2-353.

12.2-29

551.586:59:016

†**Bibliography on zoological bioclimatology.** *International Journal of Bioclimatology and Biometeorology*, Leiden, Vol. 3, Pt. 3, Sec. D, 1959. 28 p. **DWB**—An alphabetically (by author) arranged bibliography of articles on zoological bioclimatology. The bibliographical references are grouped under 3 headings: general zoological bioclimatology (197 items); entomological bioclimatology (404 items) and veterinary bioclimatology (118 items). The material of this bibliography is made up of bibliographical references supplied to the secretariat by the Members of the Society. *Subject Heading: 1. Bibliography on zoological bioclimatology.*—A.V.

12.2-30

551.586:016

†**Bibliography on phytological bioclimatology.** *International Journal of Bioclimatology and Biometeorology*, Leiden, Vol. 3, Pt. 2, Sec. F, 1959. 24 p. **DWB**—An alphabetically (by author) arranged bibliography of articles on phytological bioclimatology. The bibliographical references are grouped under 4 headings: general phytological bioclimatology (298 items);

general agricultural bioclimatology (220 items); agricultural phenology (36 items) and forest bioclimatology (133 items). The material of this bibliography is made up of the bibliographical references supplied to the secretariat by the Members of the Society. *Subject Heading:* 1. Bibliography on phytological bioclimatology.—A.V.

12.2-31

551.5:019.941:016(05)

International Union of Geodesy and Geophysics. Committee on Geophysical Bibliography, *Meteorological Abstracts and Bibliography*. I.U.G.G., *Chronique*, No. 21:139-140, May 1959. DWB—It is stated that "the field of meteorology is adequately covered by Meteorological Abstracts and Bibliography published by the A.M.S." Scope of abstracts and subjects of each of the 99 special bibliographies in Vol. I-IX, incl. are listed and subscription price given. *Subject Headings:* 1. Meteorological Abstracts and Bibliography 2. Meteorological bibliographies.—M.R.

12.2-32

551:019.941(05)

AGI undertakes international abstracts survey. *Geotimes*, Wash., D. C., 11(9):9, March 1958. DGS—A Commission of 13 from Holland, Germany, U.S.S.R., U. K., Belgium, S. Africa, U. S., France, Venezuela and Switzerland was set up in 1956 at the 20th International Geological Congress to consider the establishment of an international abstract service. A meeting in June 1957 considered details of the International Journal of Geological Abstracts and made a survey. Various existing minor services in the field of geology are listed. About 70% coverage of the world's literature is expected. *Subject Headings:* 1. International Journal of Geological Abstracts 2. Abstracting periodicals 3. Geology abstracts.—M.R.

12.2-33

551.521:539.12:001.4

Duffieux, Michel P., *Le photon entre l'onde et le corpuscule*. [The photon between the wave and the corpuscle.] *Revue d'Optique*, Paris, 38(12):563-568, Dec. 1959. French and English summaries. DLC—Attempts to reduce the wave-corpuscle dualism to an axiom are premature. This dualism is the incomplete form of a coherent theory of light. Theoretically it is associated with the discrepancy existing between transcendent and operational definitions. The amount of information available in transcendent definitions is infinite whereas that given by experiment is always finite. Technically, the dual character is associated with two experimental groups which probably do not act as the final coordinated experiment: a) the energetic group that leads through enumeration of individuals to the corpuscular view; b) the kinematic group that mixes individuals into statistical wave-shaped laws. About photons there are no linking experiments as about corpuscles of matter. *Subject Headings:* 1. Photons 2. Radiation terminology 3. Corpuscular radiation terminology.—Author's abstract.

B. APPLICATIONS

1. AERONAUTICS

12.2-34

551.591.31:551.510.42:656.71

Holzworth, George C., *A note on visibility at Sacramento, Calif.* *Monthly Weather Review*, Wash., D. C., 87(4):148-152, April 1959. 3 figs., 2 tables, 4 refs. DWB, DLC—Daylight visibility observations at the Sacramento Municipal Airport were used to investigate the possibility that visibility in the area has been declining due to rising levels of air pollution. Those visibility observations made with naturally occurring fog (defined as relative humidity greater than 90%) and/or precipitation were eliminated from the data. Observations for July, a warm, dry month with relatively slight climatic differences from year to year, and November, a cool month that often exhibits a considerable annual variation of climate, were tabulated for the three 4-year periods, 1935-38, 1945-48, and 1953-56. The results show that for July the percent frequency of poor visibilities steadily increased, and of good visibilities steadily decreased over the last 20-odd years. Such a trend is consistent with the Sacramento population increase. For November the trend was irregular. This is believed to be due to variations in the occurrence of meteorological factors important to atmospheric dispersion.

It is likely that such irregularities are characteristic of other months and areas where there are large annual climatic variations. From concurrent surface wind observations, the preferred wind conditions for various visibility ranges were determined. These data indicate that poor visibilities at the airport, on the southern edge of the city, occurred most frequently with light winds from over the nearby Sacramento urban area. Good visibilities were favored by moderate winds from rural directions. Visibilities were reduced when the wind speed became strong enough for loose materials to be picked up from the ground. *Subject Headings: 1. Day-time visibility 2. Atmospheric pollution effects on visibility 3. Airport visibility 4. Sacramento, Calif.—Author's abstract.*

12.2-35

551.591.3:551.552:656.71(420)

Thomas, E. R., **Visibility and surface wind at Manchester airport.** *Meteorological Magazine*, London, 88(1,042):104-109, April 1959. 2 figs., table, ref. DWB, DLC—During the years 1947 through 1951 visibility and surface wind at Manchester Airport were studied. The variations in their patterns are included in a chart form. In addition to the fact that industrial smoke and fog are the important sources, four other reasons are given for the poor visibility in the area. *Subject Headings: 1. Airport visibility 2. Visibility variation 3. Surface wind data 4. Manchester, Eng.—N.N.*

12.2-36

551.574.7:629.135.2

Johnstone, C. L. (*Air Defense Command, RCAF*), **An occurrence of airframe icing at low temperature.** *Weather*, London, 13(12):404-407, Dec. 1958. 4 refs. DWB During 1950-53 flights in Canada, no water drop clouds were found at temperatures $< -22^{\circ}\text{C}$ for cumulus clouds or -28°C for stratiform clouds. However on Dec. 10, 1957 at 1706 GMT a T-33 jet airplane, at 24,000 ft 50 mi north of Montreal encountered for 1 min. opaque ice, half an inch on the leading edge. Temp. was -35°C in the overcast at that level. The Maritime Front extended from east of Virginia to the Montreal area where it occurred at 17,800 ft with wind 230° at 60 kt parallel to the frontal surface. *Subject Headings: 1. Icing of jet aircraft 2. Supercooled clouds at -35°C 3. Montreal, Quebec.—M.R.*

12.2-37

551.508.26:551.507.352

Howland, Walter Lavern, **Measurement of ambient air temperature in flight.** *Institute of the Aeronautical Sciences, N. Y., Sherman M. Fairchild Publication Fund Paper*, No. 106, (1959?). 6 p. 5 figs., 10 refs. (latest date 1945). DWB (M24.35 H864me)—Ambient air temperature probe calibrated by three different methods has been discussed. The results of these tests are illustrated in charts. The author gives a brief calculation of the adiabatic rise. The successful functioning of the probe depends largely on its design, size, and construction in order to minimize radiation and conduction heat transmission. *Subject Headings: 1. Ambient air temperatures in flight 2. Ambient temperature measurement techniques.—N.N.*

12.2-38

551.584:629.139.5

Sartor, J. Doyné, **Evaluation of the effect of environment on refueling operations.** *Rand Corporation, Santa Monica, Calif., Research Memorandum*, RM-2322, Jan. 27, 1959. 27 p. 12 figs., 4 refs., 6 eqs. DWB (507.2 R186r)—As desired by the Air Weather Service, a technique for a quantitative evaluation of the SAC refueling operation, in terms of probable environmental conditions for each month of the year of a selected region, is given here. Charts with plotted isolines of ERR (i.e., extra range due to refueling) are provided. The discussion is restricted to evaluation rather than methodology, the latter is discussed in an earlier report (RM-2080). *Subject Headings: 1. Environmental effects on airplane refueling 2. Airplane refueling.—W.N.*

12.2-39

551.507.352:551.551.5

*Copp, Martin R. and Fetner, Mary W. (both, Langley Res. Center, Langley Field, Va.), **Analysis of acceleration, airspeed, and gust-velocity data from a four-engine turboprop transport operating over the eastern United States.** *U. S. National Aeronautics and Space Administration, Technical Note*, D-36, September 1959. 21 p. 6 figs., 4 tables, 13 refs. DWB,

DLC—Time-history records of airspeed, altitude, and acceleration were obtained with an NASA (formerly NACA) VGII recorder installed in a four-engine turboprop transport operating over the eastern United States. The records were evaluated to determine the magnitude and frequency of occurrence of gust velocities and gust accelerations. The results obtained were then compared with the results previously obtained from two long-haul operations utilizing transports equipped with four piston-type engines and flown over essentially similar routes. *Subject Headings: 1. Airplane observations 2. Gust data.*—NASA.

12.2-40

551.5:629.13

551.501:551.591

551.509.1:621.397.9

Slootmackers, P., *Gebruik van de industriële T.V. in de weerkunde voor de luchtvaart*. [Employment of industrial T.V. in aeronautical meteorology.] *Belgium. Régie des Voies Aériennes. Service Météorologique, Bulletin Trimestriel*, March/May 1959. p. 1-7. 4 figs. **DWB**—The latest measurement technique is the operation of T.V. in closed circuit. The aeronautical meteorology research has made possible the measurement of artificial visibility over Tarmac and meteorological briefing. The author gives a description of experiments made between 15/2 and 1/4/59 by the services of the R.V.A., and also details about the material, the working conditions, the measurement techniques and the results. Under normal working conditions, it was stated that observation made by T.V. was 35 m lower than visual observation. Meteorological briefing at distance is considered; briefing services are not to be separated from forecast services, analysis and telecommunication services. The R.V.A. will establish a link between briefing and the Met. Office by using a T.V. set for emission of general weather charts and most recent meteorological information for flight. The author finds the measurement of artificial visibility by T.V. very practical. However, to simplify the setting it would be preferable to adjust a diaphragm with an automatic setting at the camera. The described methods can be used for the measurement of oblique visibility, the most important in aeronautics. *Subject Headings: 1. Aeronautical meteorology 2. Visibility measurement techniques 3. Television weather transmission 4. Weathervision.*—A.V.

12.2-41

551.558.1:629.135.1

Agésilas, M., *Le développement du vol à voile et son importance pour l'aviation et la science*. [The development of gliding and its importance for aviation and science.] *Schweizer Aero-Revue*, Bern, 33(8):436-439, Aug. 1958. **DLC**—The author shows the important part played by the glider in the advancement of aeronautical construction, training of navigating officers and aerological research. Particularly in aerological research, the explanation of up-draft slopes and connected phenomena was only possible with the cooperation of gliders. *Subject Headings: 1. Gliding 2. Up-drafts 3. Thermals.*—A.V.

12.2-42

551.558:551.556.3:797.551

Bilan d'une saison d'activité véliplane. [Seasonal activity in gliding.] *Les Ailes*, Paris, 38(1703):14, Nov. 1958. 1 fig. **DLC**—The season of 1958 was not favorable for the Limousin Aéro-Club—4th in competition for the Sylvain-Floirat cup. Only the 11/4/58 had a classical NE situation. That day a "Milan" covered the distance Limoges-Pau in 5 hours. On Aug. 3, by light instability, a air-102-glider made a flight of 300 km from Limoges to Carcassonne after great difficulty. Although the season was disappointing, it has been established that flights over a distance of 300 km are easy to make; also flights from 500 km are possible but require a great performance glider. *Subject Headings: 1. Gliding 2. Wind utilization 3. Wave flight.*—A.V.

12.2-43

551.556.3:551.558.2:797.551(234.1)(448.1/7)

Le vol d'onde pyrénéen à l'Aéro-club du Languedoc. [The Pyrenean wave-flight at the Languedoc Aéro-Club.] *Les Ailes*, Paris, 39(1714):14, Jan. 31, 1959. fig., table. **DLC**—1959 marks the fiftieth anniversary of the Languedoc Aéro-Club. The author gives an account of the development and the activity of the club during 1958, followed by a table of the wave flights made during 1958 and Jan. 1959 from the La Llagonne airfield. *Subject Headings: 1. Gliding 2. Lee waves 3. Wind utilization 4. Vertical wind components 5. Languedoc, France.*—A.V.

B2. ASTRONAUTICS—SATELLITES

12.2-44

551.507.362.2:521.312

Okhotsimskii, D. E.; Eneev, T. M. and Taratynova, G. P., (*Akademiia Nauk SSSR*), **Opreделение vremeni sushchestvovaniia iskusstvennogo sputnika Zemli i issledovanie vovoykh vozmushchenii ego orbity.** [Determining the time of existence of the artificial earth satellite and studying secular perturbations of its orbit.] *Uspekhi Fizicheskikh Nauk*, Moscow, 62(1a):33-50, Sept. 1957. Also issued in *International Astronautical Congress, Proceedings of the 8th Congress, Barcelona, 1957*, issued Vienna, 1958. p. 514-532. 2 figs., 2 tables, 5 refs., 42 eqs. English summary p. 531. **DLC** (TL787.144). Transl. into English issued in *Massachusetts Institute of Technology*. Lincoln Lab., **Collection of Soviet papers on earth satellites.** Issued 1957; reissued 1958. Available. **DWB** (629.1388 M414co) -The paper cites the original data used for the computations. The equations of satellite motion in osculating elements are reduced to a new independent variable convenient for the investigation in hand. This is followed by an exposition of the methods of integrating differential equations for secular perturbations of the parameter and the eccentricity of the orbit due to the effect of air resistance; then the results so obtained are discussed. The paper also provides a substantiation of the basic simplifying assumptions used in the computation, and gives an appraisal of the methodical error resulting from these assumptions. An approximative study is also made of the secular perturbations of the orbit due to Earth compression and the rotation of the atmosphere. *Subject Headings:* 1. Satellite orbits 2. Satellite lifetime. *from authors' abstract.*

12.2-45

551.507.362.2:621.396.8

Guier, William H. and Weiffenbach, George C. (both, *Applied Physics Lab. Johns Hopkins Univ. Silver Spring, Md.*), **Theoretical analysis of Doppler radio signals from earth satellites.** *Nature*, London, 181(4622):1525-1526, May 31, 1958. 2 tables, 2 eqs. **DWB** -A brief description is given of the method of determining the orbit of an artificial satellite from measurements of the Doppler shift of its radio signals. A detailed description of the present analysis will be published in the future. *Subject Headings:* 1. Satellite orbits 2. Doppler shift of satellite signals.—*N.N.*

12.2-46

551.507.362.2

Tretii sovetskii iskusstvennyi sputnik Zemli. [Third Soviet earth satellite.] *Priroda*, Moscow, No. 6: folded sheet after p. 8, June 1958. 2 illus., table. **DLC**—A description, with the aid of a photograph and a diagram, of the third Soviet earth satellite, which was put into orbit on May 15, 1958. The instrumentation of the earth satellite for measuring the various elements, and its tracking are described; and a table giving the weight, pay load, apogee and perigee diameter, angle of inclination of orbit to plane of the equator, etc., of this satellite and of earth satellites I and II are presented in a table. *Subject Heading:* 1. U.S.S.R. satellites, 1958.—*I.L.D.*

12.2-47

551.507.362:629.19:523.43

Stuhlinger, Ernst (*Huntsville, Ala.*), **Von künftiger Weltraumfahrt.** [Future space travel.] *Naturwissenschaftliche Rundschau*, Stuttgart, 11(7):263-268, July 1958. 5 figs., tables. (Published in English in the *Scientific Monthly* Vol. 85, 281, 1957.) **DWB, DLC**—The author describes the technical preparation and execution of a trip to Mars as envisioned in the Mars project of WERNHER VON BRAUN. All the preparations described are based upon present-day technical and scientific knowledge and speculations on future discoveries are avoided. A space ship with an initial weight of 1700 tons and a payload of 35 tons, a crew of six to eight men and a duration of 260 days is envisaged. The paper also includes the following: description of the stages in the flight to Mars involving the establishment of space stations; the launching of landing craft to Mars from the last space stations (1000 km from Mars) and the return from Mars; the construction requirements of the space ship; the electrical motor system; the internal structure of the electric space ship; the flight path, and the return voyage. *Subject Heading:* 1. Interplanetary flights.—*I.L.D.*

12.2-48

523.4:629.19

Christensen, H. C., *Ut i verdensrommet I*. [In space, Pt. 1.] *Naturen*, Bergen, 78(3):66-83, 1954. 14 figs. **DLC**—Some astronomic problems in relation to travel in space are discussed. The parabolic speed (i.e., the speed that must be attained to release a body from dependency of gravity) and the speed of a body revolving around the earth as a function of distance, are given in a graph. Energy graphs for earth-moon and the sun system are presented along with typical paths in the gravitation fields of the Earth, Mars and Venus. Various rocket types are described, speeds of which are graphically presented as a function of mass and speed of the gas. Space rockets must attain a speed of 8 km/s. The 2-3 km/s speed of present rockets may be increased by atomic energy. *Subject Headings*: 1. Interplanetary flights 2. Rockets 3. Space ships.—W.N.

12.2-49

629.19(09) 551.507.362

Ley, Willy (*Space Historian, Jackson Heights, N. Y.*), **Long history of space travel**. *Franklin Institute, Phil., Journal . . . Monograph*, No. 6:1-11, Dec. 1958. **DWB** (629.1388 F832te)—The existence of the moon as a body rather than light was suggested by PLUTARCH in 120 B.C. and the first fiction on space travel was written in 160 A.D. by the Greek author LUBIAN of Samosta. In 1277 the Bishop of Paris declared, with consent of the Pope, that it would be wrong to think that there can be only one inhabited world. The bulk of the space vocabulary used was coined by JOHANNES KEPLER, who died in 1630 A.D., and the first scientific paper on space travel was by a Russian, KONSTANTIN EDVARDOVITCH ZICKOWSKY. The American, ROBERT H. GODDARD took out patent in 1914; his first rocket motor came Nov. 1, 1923 and the first flight anywhere of a liquid fuel rocket was the one of Goddard's design March 16, 1926. Then the V-2 rocket was developed and interest in space travel was intensified. *Subject Headings*: 1. History of astronautics 2. Interplanetary flights.—W.N.

12.2-50

551.506.22:551.507.362.1

Rocket firing contribution to Geophysical Year. *Current Science*, Bangalore, 27(5):159-160, May 1958. **DWB, DLC**—In the Geophysical Year, 81 research rockets were fired in the U. S. from July 1 to Nov. 30, 1957 out of a total of 120. From the result of the 18 "rockoon" firings auroral particles were studied. From Fort Churchill (58°40'N) conditions in the ionosphere were explored and compared to the results obtained during a polar radio black-out of 1932-33. Other firings were carried out for specific purposes, one of which was the study of temperatures in the stratosphere at heights greater than 37 mi. Electro-jet currents have been studied too at various stations in the Pacific and South America. The data from Koror, in the Western Pacific, indicate the existence of electro-jet currents. *Subject Headings*: 1. IGY rocket soundings 2. Electrojet 3. Stratospheric temperatures.—N.N.

B3. MARINE METEOROLOGY

See also: Shipping operations, Hudson Bay, 12.2-192; Collision prevention through radar, 12.2-200; Navigation in hurricanes (Myers), 12.2-309; Marine met. terminology (Rodewald), 12.2-353.

12.2-51

551.501.1:551.508.43:551.46

Shinners, Willard (*Marine Observations, U. S. W. B.*), **Hints to the observer [on] static charge on marine barograph**. *Mariners Weather Log*, Wash., D. C., 3(1):11-12, Jan. 1959. fig. **DWB**—Recommends use of a few drops of liquid detergent on a damp cloth when cleaning the model G-222 marine barograph. Otherwise the static charge of its plastic window can pull the pen arm off the chart. *Subject Headings*: 1. Barographs 2. Instrument maintenance.—W.N.

12.2-52

551.507.2(261)

Frankcom, C. E. N., **A new ocean weather ship**. *Marine Observer*, London, 28(182):216-218, Oct. 1958. **DLC**. Also his article, same title, in *Meteorological Magazine*, 87(1037):331-333, Nov. 1958.—On May 16, 1958, the former class frigate, H.M.S. "Oakham Castle" (built 1944) was renamed "O.W.S. Weather Reporter" by LORD HURCOMB, Chairman of the British

Meteorological Committee, marking the beginning of her career as an ocean weather ship. There is a detailed description of her accommodations for the officers and crew and her meteorological equipment. *Subject Headings: 1. Weather Ship "O.W.S. Weather Reporter" 2. Meteorological equipment.—Author's abstract.*

12.2-53

656.6.02(26)

Marcus, Sidney O., Jr. (*USN Hydrographic Office, Wash., D. C.*), **The United States Navy Hydrographic Office ship-routing program.** *New York Academy of Sciences, Transactions*, Ser. 2, 21(4):340-351, Feb. 1959. 6 figs., table, 12 refs., eq. **DLC**—Improvements in medium range (2-7 day) wind and wave forecasting have made it possible to use optimum track computations for routing naval vessels as well as merchant vessels during the past 5 years. Examples of synoptic wave charts, nomograms used in constructing least time tracks and actual computation for 1-5 days, surveillance and evaluation of savings are presented in text, graphs and charts. Estimated saving of time for Atlantic and Pacific tracks was 145 hours or \$2,000 per crossing. The least time track is not necessarily the optimum track and vice versa, for wave conditions may be too severe on least-time track for certain types of deck cargo or for aircraft carriers with aircraft on deck. *Subject Headings: 1. Ship routing program 2. Optimum ocean tracks 3. Least-time ocean tracks 4. U. S. Navy Hydrographic Office. M.R.*

12.2-54

551.5:061.1(43)

551.509.1:621.397.9

Seilkopf, Heinrich, **Fünf Jahre Seewetterdienst des Seewetteramtes.** [Five years of the Marine Weather Service of the Seewetteramt.] *Der Wetterlotse*, Hamburg, No. 129:65-73, April 1958. **DWB, DLC**—The German Sea Weather Service published its first sea weather map on Jan. 1, 1953. An account of the activities and developments of this service is given here. A recent feature is the so-called "Kleinfax" transmitter and receiver enabling wireless transmission of facsimiles of any kind. *Subject Heading: 1. German Marine Weather Service.—W.N.*

12.2-55

551.5:797.14(45)

Mancini, Marco, **I campionati del mondo della categoria Flying Dutchman ed il servizio meteorologico.** [World championships of the Flying Dutchman category and the weather service.] *Rivista di Meteorologia Aeronautica*, Rome, 18(4):31-34, Oct./Dec. 1958. fig. **DWB**—Short report concerning the special weather service organized for the world sailing championships of the Flying Dutchman category, at Rimini, in August 1957. *Subject Headings: 1. Meteorological services 2. Sailing championships 3. Rimini, Italy.—Author's abstract.*

B4. AGRICULTURE

See also: Forecasting water supply for agriculture (Dwyer), 12.2-167.

12.2-56

551.501.724:537.311

551.524.37:632.111.5:633.491

Fourré, J., **Action du froid sur les tubercules de pommes de terre.** [Effect of cold temperatures on potato tubers.] *Académie des Sciences, Paris, Comptes Rendus*, 250(12):2261-2263, March 21, 1960. fig., ref. **DWB, DLC**—Measuring the electric resistance of potato tissues makes it possible to determine at each moment the proportion of dead cells in these as a result of low temperatures. During the experiments, tubers were submitted to temperatures ranging from -3°C to -14°C . At -3°C the death of tissues is slow and when the temperature decreases it becomes more progressive. At -4°C , a stage like at -3°C is observed, but it lasts only for 3 hrs. The stages of the resistance curve of tubers submitted to temperatures of -3°C to -5°C result from supercooling phenomena within the tissues. *Subject Headings: 1. Frost damage to potatoes 2. Temperature measurement 3. Electrical conductivity measurements.—A.V.*

12.2-57

551.586:551.577.21:633.71

du Plessis, D. P., **High rainfall affects tobacco yields adversely.** *Farming in South Africa*, Pretoria, 35(11):23-25, Feb. 1960. photo, 2 figs. **DLC**—Survey of the rainfall amount during

the tobacco season (Nov. to Feb.) from 1943 to 1959 at the Central Tobacco Research Station, Rustenburg, as correlated with tobacco yields. A total rainfall of more than 20 in. during the four months causes a sharp decrease in production. In general, rainfall from 8 to 16 in. gives a good year and rainfall from 16 to 20 in. a medium year. From 1927 to 1959 there were therefore 18 good years, 9 medium years and 6 bad years. *Subject Headings:* 1. Agricultural meteorology 2. Rainfall effects on tobacco production 3. Tobacco culture 4. Central Tobacco Research Station, Rustenburg, South Africa.—A. V.

12.2-58

551.582.2(443.611)

551.586:63

551.577.38:633.63

Geslin, H., *Aspects climatiques de la campagne agricole 1958/1959*. [Climatic aspects of the agricultural year 1958/1959.] *Académie d'Agriculture de France, Paris, Comptes Rendus*, 46(4):165-172, Feb. 17, 1960. 5 figs. **DLC, DA**—This climatological survey deals primarily with the evolution of temperature, precipitation and sunshine duration during the various decades of the agricultural year 1958-1959. The author examines at first the evolution of these factors in the region of Paris by taking data from the Bioclimatological Station at Versailles, and then gives a survey of the weather over the whole of France. The agricultural year 1958-59 was characterized by high mean temperatures in all seasons, exceptionally abundant sunshine, and by very short precipitation amounts in the north but excessive in the south. Hydrous profiles made in the height of the drought period in beet and fruit cultures respectively show that the latter did not suffer from the drought whereas beet cultures did suffer considerably. The deep and rich soil reserves went down in large proportions. Should the winter be dry and the coming summer moderately wet, then plants may be expected to suffer from the drought at the end of the summer 1960. *Subject Headings:* 1. Climatic summary 2. Climatic data, Paris region 3. Weather-crop relationships 4. Drought effects on sugar beet yield 5. Paris, France.—A. V.

12.2-59

551.586:633.2

Nuevy, A. and Bligoud, R., *Prairies temporaires et climat probable en Ille-et-Vilaine*. [Temporary meadows and probable climate in Ille-et-Vilaine.] *France. Ministère de l'Agriculture, Bulletin Technique d'Information*, No. 146:41-59, Jan. 1960. 8 figs., 8 tables, 9 refs. **DA, DLC**—Study of the climatic elements, temperature and rainfall, as factors limiting the grass production in the meadows of the Ille-et-Vilaine Department (France). In spring the limiting factor for the growth of grass is the temperature; never the lack of water. In summer the temperature is not the limiting factor but the drought. The sums of the isolated and then cumulated temperatures from Sept. 1st and from Jan. 1st have been computed for 3 stations in Ille-et-Vilaine. This calculation shows that the development of meadow plants is an increasing function of the sums of temperatures. This principle enables to base the forecasts of development on the sums of temperatures starting from Sept. 1 for the meadows sown in autumn, and from Jan. 1 for the existing meadows. The second part of the article deals with the study of rainfall; the danger of abundant rainfall in spring; the correlation between temperature and precipitation and the investigation of summer rainfall. The methods for measuring the potential evapotranspiration have not been neglected. The concept of potential evapotranspiration leads to the definition for each soil of a critical rainfall deficit with regard to this value which characterize the climate. Using data from the past, the probability of various deficits has been computed for several regions in the Ille-et-Vilaine Department. *Subject Headings:* 1. Agriculture meteorology 2. Weather effects on pastures 3. Cumulative temperature effects on plants 4. Precipitation effects 5. Evapotranspiration 6. Ille-et-Vilaine, France.—A. V.

12.2-60

551.586:634.16

Ziller, R., *Etude de quelques facteurs agissant sur la teneur en coprah des noix de coco*. [Study of some factors influencing the content in copra of cocoa nut.] *Oléagineux*, Paris, 15(2):73-81, Feb. 1960. 7 figs., 5 tables, 14 refs.—After having dealt with some notions of floral biology, the author successively studies the influence of genetic characters, climate, mineral nutrition and quantity of nuts produced on the weight of copra contained in each nut. The three climatic factors: rainfall, temperature and sunshine are considered. There is no

relation between the rainfall and the curve of cocoa nut albumen-content; the correlation with temperature is apparent but not strongly marked. But on the other hand, it seems that the sunshine duration during the last 4 months preceding ripeness influences the copra-content and is responsible for the important seasonal variations. At last, the number of nuts and the weight of copra contained in each nut present intricate relations. Although not independent from each other, they do not present a direct relationship, because of the different climatic factors which seem to have the principal action; insolation for the quantity of copra, and probable rainfall for the number of nuts. *Subject Headings:* 1. Agricultural meteorology 2. Cocoa nuts 3. Weather influences on copra content.—A.V.

12.2-61

551.586:633.74 551.584.41

Cornwell, P. B. (*West African Cacao Res. Inst., Tafo, Ghana*), Some climatological observations on Amelonado cacao. *Tropical Agriculture*, London, 37(1):67-71, Jan. 1960. 4 figs., 4 refs. **DLC, DWB**—This article studies two factors of the microclimate within cacao in Ghana: temperature changes and changes in evaporation rate. Maximum, minimum and 9 a.m. temperature measured in screen outside cacao during July-Aug. 1955 are compared with shade temperatures measured by continuous recording thermometers in mature farmer's cacao, at ground level and 19 ft above ground in the upper levels of the canopy. It is shown that temperatures below the canopy level are buffered against the wide diurnal range outside the crop. Temperatures at canopy level are also buffered, though in a lesser degree. Rates of evaporation were measured from Sept. 1954 to Sept. 1955 at four elevations: 1.5, 12, 21 and 30 ft above ground in cacao with a closed canopy and in a clearing. Evaporation rate in the clearing increased linearly with height and exceeded that in the standing cacao at all elevations by 21.0% near the ground, 21.1% just below the canopy, 40.6% at canopy level and 5.0% above it. The seasonal range in cacao stands is greatest at ground level and diminishes with height. *Subject Headings:* 1. Agricultural meteorology 2. Microclimates 3. Cacao culture 4. Temperature and evaporation at canopy level.—A.V.

12.2-62

551.586:551.521.1:632.94

†Riepma, P., Interrelationships between methods of spray application, retention, and weather conditions on the herbicidal efficiency of 2,4-dinitro-ortho-cresol. *Plant and Soil*, The Hague, 12(3):223-248, April 1960. 11 figs., 11 tables, 26 refs. English summary p. 246-247. **DLC**—Employing four test plants (*Brassica napus*, *Fagopyrum exultentum*, *Pisum sativum* and *Triticum vulgare*) the effects of varying the spray output (0.55 to 20 mm³/cm²) and the nozzle orifice (mean mass diameter of spray droplets 160-408μ) on retention by the shoots of young seedlings were first investigated. As long as the nozzle output did not exceed 15 mm³/cm², then for each species and for each nozzle the level of retention was proportional to the volume of spray reaching the leaf surface. For a given output the proportion retained was inversely related to the mean droplet size. The magnitude of this effect was greatest for *T. vulgare* and least for *P. sativum*. Lowering the surface tension of the spray solution or pretreating plants of *P. sativum* with trichloroacetic acid diminishes the contact angle made between the drops and the leaf surface and this reduction in the angle is associated with a higher retention ratio. The relation between the amount of spray retained and the concentration of 2,4-dinitro-ortho-cresol (DNC) required to kill half the plants of *F. exultentum*, *P. sativum* and *B. napus* was studied. For each species, irrespective of spray output or mean droplet size the equi-effective dose of DNC remained constant i.e. the equi-effective concentration was constantly and inversely proportional to the level of retention per unit surface. Statistical analysis of a series of experiments undertaken at different seasons of the year on *B. napus* demonstrated that the magnitude of the equi-effective dose of DNC was primarily dependent on the total solar radiation received during the first few hours after the spray application. *Subject Headings:* 1. Agricultural meteorology 2. Plant protection 3. Weather effects on herbicidal efficiency 4. Solar radiation influence on spray application.—*Author's abstract.*

B5. FORESTRY—FIRE WEATHER

See also: Forest influences on runoff (Onufrienko), 12.2-165; Forest hydrology, Emme Valley (Casparis), 12.2-173.

12.2-63

551.588.6:551.579:551.482.2

†L'vovich, M. I., *Effektivnost' zapretnykh vodookhrannykh polos lesa vdol' rek i problema ikh ekspluatatsii*. [The effectiveness of restricted forest strips along rivers in water conservation and the problem of their exploitation.] *Vsesoiuznoe Geograficheskoe Obshchestvo, Leningrad, Izvestiia*, 90(5):424-437, Sept./Oct. 1958. 27 refs. DLC—The restricted forests along rivers occupying widths of 1-6 km presumably serve the purpose of water conservation and regulation. In this paper the author attempts to determine the validity of this conception. About 7-20% of the river runoff of the mixed forest zone of European USSR is under the influence of regulating forest belts but 80-93% of the runoff is formed outside the belts of restricted forests which, therefore, do not exert any effect. The restricted forest belts along river banks have no particular water regulating properties: any forest maintained in good condition is a good regulator of runoff by reducing spring floods and increasing runoff during low water. Forests have a large water regulating effect when located across individual slopes. They not only regulate the flow within the territory they occupy but also intercept water from higher slopes. An analysis of the process of river silting and formation of sandbanks indicates that restricted forests along rivers cannot prevent their occurrence since the forests do not influence the flow of channels, which intersect forest belts and transport loads acquired outside the forest belts. One type of sandbank is that formed by the accumulation of erosion products from gullies immediately extending into the rivers. Continuous felling of trees (within the limits of mean annual growth) does not disturb the water conserving properties provided the soil is not damaged and afforestation is immediate. The increase in the intensity of snow melting in restricted forests when felling of trees is continuous amounts to 2-4% for small leaved trees and 3-5% for fir trees. The intensity of floods in the temperate zone forests is not proportional to the rate of snow melt but is considerably less. The increase in surface runoff as a result of intensity of snow melt is insignificant. Continuous felling in restricted forest does not affect perceptibly the climate humidifying role of the forest. The area of tree cutting increases slightly when afforestation is immediate and transpiration is reduced only in the early years. Where transpiration of forests is at the expense of ground water, felling of trees may lead to swampiness, especially in western Siberia, and the water balance and river regime may be affected. The author concludes that further maintenance of restricted forest belts along rivers has no scientific basis and is useless in water regulation and conservation. *Subject Headings*: 1. Forest influences on water regime 2. Hydrography 3. Forest strip effects.—I.L.D.

12.2-64

551.579.5:634.94

Seth, S. K. and Waheed Khan, M. A., *An analysis of soil moisture regime in sal (Shorea Robusta) forests of Dehra Dun, with reference to natural regeneration*. *The Indian Forester*, Dehra Dun, 86(6):323-335, June 1960. 4 figs., 5 tables, 14 refs. DA, DLC—Dehra Dun valley sal forests, conforming to Champion's B-3 high level alluvium type, characteristically reproduce freely but sometimes the reproduction is deficient, particularly in areas which are rigidly fire-protected. The long history of forest management and protection has led to conditions under which large tracts of these forests are not reproducing adequately. The existing conditions have, therefore, been investigated with regard to seed-source, seed bed conditions, climate, light, moisture, nutrient requirements and the ameliorative effects of fire. In particular, an analysis of the soil moisture regime has been made and correlated with the various development stages of sal seedlings. Tables indicate the mean values of the main climatic factors in this region. On the other hand a table gives the soil moisture for individual layers and soil moisture regime for increasing depths. In each case the values of field capacity for each layer and moisture at wilting point for the layer are given. Suggestions have also been made with regard to adoption of suitable forestry practices to achieve regeneration and to promote the timely establishment of sal seedlings. It is concluded that if the manipulation of sal forests is carried out in a manner conforming to the climate-ecological requirements of sal seedlings, a regeneration period of 15 to 30 years should suffice to restock the area. *Subject*

Headings: 1. Soil moisture variations 2. Soil moisture profiles 3. Forest regeneration
4. Dehra Dun, India.—A.V.

12.2-65

551.558.1:546.57:546.15:581.33

Lloyd, Merle G. (*U. S. Forest Serv., Spokane, Wash.*); O'Dell, Clyde A. and Wells, H. J. (*both, U. S. Forest Service, Missoula, Mont.*), **A study of spore dispersion by use of silver-iodide particles.** *American Meteorological Society, Bulletin*, 40(6):305-309, June 1959. 2 figs., 8 refs. **DWB, DLC**—Silver-iodide particles were used to simulate the movement of white-pine blister-rust spores on a white-pine plantation in northern Idaho where long-distance spread of the disease is suspected. It was hypothesized that cold drainage winds were carrying spores down to a relatively warm lake where convective currents carried the spores aloft. The spores were then distributed over the plantation when a favorable upper-air flow prevailed. Silver-iodide particles were released at the suspected source of infection and traced into the plantation. **Subject Headings:** 1. Spore dissemination 2. Wind transport 3. Tracer techniques.—*Authors' abstract.*

12.2-66

551.553.1:632.187

Coffin, Harry, **Effect of marine air on the fireclimate in the mountains of Southern California.** *U. S. Forest Service. Pacific Southwest Forest and Range Experiment Station, Berkeley, Technical Paper*, No. 30, Sept. 1959. 30 p. 18 figs., table, 4 foot-refs. **DWB** (634.0U583te)—During the summer months marine air penetrates into the interior of southern California to a greater or lesser extent depending upon the air flow patterns of the general circulation of the atmosphere. These are seasonal variations in the strength of the marine influence, a maximum in late June and early July and a minimum in August and early September. These variations are also associated with changes in the general circulation, and the poleward contraction and expansion of the belt of the westerly winds. The relatively cool, moist marine air tends to reduce forest fire danger by increasing the moisture content of fine fuels. During spells of strong marine influence, called Catalina Eddy circulation, there is a lower incidence of major forest fires in the wildlands of southern California. Further, local circulations within the mountains are upset by the strong inflow of marine air. The diurnal mountain-valley wind system is replaced by winds blowing day and night from the lowlands to the highlands. The marine influence is widespread and extends to high elevations. All of the seaward parts of southern California are affected. **Subject Headings:** 1. Sea breeze circulation effects on fire weather 2. Fire weather studies 3. Southern California.—*Author's abstract.*

12.2-67

551.501.45:551.586:632.187

McArthur, A. G., **The preparation and use of fire danger tables.** (In: *Fire Weather Conference, Melbourne, Australia, July 1958, Proceedings*, issued Melbourne, 1958. Conference Paper, No. 10 (18 p.) 6 tables, 5 refs.) **DWB**—One of the major projects in fire research undertaken by the Forestry and Timber Bureau has been an intensive study of fire behaviour in various fuel types, and the relationship of this behaviour to commonly measured meteorological factors. Such studies naturally led to the compilation of tables suitable for rating fire danger. The basis of such tables and their implications will be broadly discussed in this paper. **Subject Headings:** 1. Fire danger rating tables 2. Fire weather.—*Author's introduction.*

12.2-68

551.509.58:551.577:632.187(711)

Turner, J. A., **The evaluation of rainfall probability forecasts for forestry.** *Canada. Meteorological Branch, CIR-3148, TEC-290*, Jan. 15, 1959. 5 p. 2 figs., 2 tables, 3 refs. **DWB, DLC**—Forecasts of the probability of occurrence of measurable rainfall occurring during the balance of the same day and during the following day were issued daily for eleven stations in British Columbia during the 1958 fire-season as part of an expanded program of fire weather forecasting by the staff of the Vancouver Public Weather Office. These forecasts have been evaluated in much the same way a similar program at San Francisco was assessed by ROOT. There is evidence of significant skill in assigning probabilities except possibly in the central third of the probability range. The variations in the value of the Brier and Allen 'P-score' show a marked dependence on the changeability of the weather over the period considered,

which is associated with a lack of adequate techniques for forecasting the end of a dry period with any marked degree of confidence. *Subject Headings:* 1. Probability forecasts 2. Rain-fall forecasting 3. Fire weather forecast accuracy 4. British Columbia.—*Author's abstract.*

B6. MEDICINE

12.2-69

551.586:616.859

Novák, J. (*Czechoslovakia*), *Ueber die Periodizität einiger klinischen Krankheitsformen.* [Periodicity of certain clinical forms of disease.] *International Journal of Bioclimatology and Biometeorology*, Leiden, Vol. 1 (Pt. 4, Human Bioclimatology), 1957. 2 p. DWB—The author presents evidence of the existence of periodicities in neurodigestive diseases. In the course of a month there were usually observed five periods of disturbance of unequal duration and varying intensity with seasonal variations. Every attack repeats itself every 27 days (plus or minus up to 48 hours). Since five groups of neurodigestive disturbances of varying intensity occur in the same patients in 27 days, the author established a provisional "wave pattern" with each wave having a duration of 5-7 days. The existence of such periodicities in various diseases is discussed. *Subject Headings:* 1. Neurological periodicities 2. Climatic effects on neurodigestive diseases.—*I.L.D.*

12.2-70

551.586:551.587:612.275.1

Verzár, F., *L'adaptation de l'homme aux grandes altitudes.* [Man's adaptation to high altitudes.] *Les Alpes*, Bern, 35(3):184-187, 1959. NN—Comments relating to some observations on the physical labor power of the native and inhabitants of the upper plateaus, especially in Bolivia. These observations mainly refer to athletic competitions. The author examines the physiological bases of adaptation and particularly the acceleration of the blood circulation and the increase of the breathing surface in the lungs under the action of oxygen rarefaction. *Subject Headings:* 1. High altitude effects on man 2. Oxygen deficiency—respiration relationships.—*A.V.*

12.2-71

551.586:612

Becker, F. (*Deutscher Wetterdienst*), *Bioklimatik.* [Bioclimatology.] *Zeitschrift für angewandte Bäder- und Klimaheilkunde*, Stuttgart, 6(2):159-177, April 1959.—8 figs., table, 3 refs. For 30 years, doctors and meteorologists have worked in the field of bioclimatology to determine the relations between atmospheric medium and the living organism. Doctors especially are interested in a series of questions concerning the climatology of health resorts. Results obtained in this field make it possible to climatotherapy specialists to obtain some indications and contra-indications about health resorts. The author gives a description of the base of the climatology of health resorts in the Taunus region and of the organization of the different services. In the beginning it was very difficult to find a correlation between weather changes and behavior of the organism. A very good detailed analysis of the different meteorological situations and conditions has been made and regular bio-climagrams have been realized by W. AMELUNG, W. CATEL and G. STRAUBE. The author gives the bioclimagrams of 2-3/3/55 and 13-14/1/55; making it possible to have a comparison and correlation. The article ends with some observations on radioactivity and impulse radiation. *Subject Headings:* 1. Bioclimatology 2. Bioclimagrams 3. Medical meteorology 4. Weather effects on man.—*A.V.*

12.2-72

551.586:616

Daubert, K. (*Deutscher Wetterdienst*), *Krankheitsbedingende Wettersituationen.* [Atmospheric conditions influencing diseases.] *Die Heilkunst*, Munich, No. 9:1-4, Sept. 1958. fig., 11 refs.—A study of the reaction of the atmospheric medium on the human organism. Taken as a whole, the action of the atmosphere is very complex; therefore one considers a schematic meteorological situation. Based on examination of statistical data for many years, supplied by the patients of the hospital of the Tübingen University and the hospitals of the Wurtemberg district, the meteorological situations favorable to diseases have been determined. Physiological phenomena and diseases have been grouped with regard to meteorological conditions.

logical conditions. *Subject Headings:* 1. Weather effects on disease 2. Tübingen University, Germany.—A. V.

B7. RADIOACTIVITY

12.2-73

623.454.92:551.510.42:550.34

Rougeron, Camille, *La détection des explosions nucléaires*. [The detection of nuclear explosions.] *L'Air*, Paris, 40(751):15-17, Sept. 1959. photo. **DLC**—A statement on the difficulties which impede the negotiations at the Geneva meeting for the prohibition of experimental nuclear explosions. The author expresses his views on the possibility of detecting nuclear explosions in the exosphere and gives an account of the controversies between seismologists about the observation of underground nuclear explosions. *Subject Headings:* 1. Nuclear explosion detection 2. Atmospheric pollution 3. Seismology.—A. V.

12.2-74

551.510.42:551.510.72

Flohn, H., *Probleme der Ausbreitung radioaktiven aerosols in der Luft*. [Spreading of radioactive aerosols in the air.] *Wasser, Luft und Betrieb*, Wiesbaden, 2(7):1-3, July 1958.—Transport in the air of aerosol particles presenting an artificial or natural radioactivity became more important during the past years as a consequence of different experiments with atomic explosions. The atmosphere is like a carrier and a depot for hanging particles which, owing to their low weight can stay for years. The author gives a short review of vertical and horizontal spreading in the atmosphere showing that air mixing is so enormous that no point on the earth's surface is protected against radioactive particles. The depositing on the earth's surface is irregular and depends especially on the precipitation and local wind system. The article concludes that artificial radioactivity is generally below natural radioactivity of ground, spring water, etc. *Subject Headings:* 1. Aerosol radioactivity 2. Artificial radioactivity.—A. V.

12.2-75

551.510.42:546.02:539.16

Klumb, H. and Dahlem, T., *Eine neue methode zum nachweis des langlebigen radioaktiven Aerosols der Atmosphäre*. [A new method to demonstrate long-lived radioactive aerosols in the atmosphere.] *Naturwissenschaften*, Berlin, 47(2):37-38, Jan. 31, 1960. 3 figs., 4 refs. **DLC**—In a centrifugal separator the aerosols are disposed on an even surface, according to their size and mass. A spiral spindle of 18 mm diameter is adjusted in a pig of steel of 300 mm length. One side of the pig is so hollowed that the spindle appears through a slit of 5 mm. This slit is covered by a foil of supranyl. On one of the heads a suction-pipe sucks in 150 mm³ air in a 24 hr period. By a section of 0.3 cm² the speed is 10¹ cm/sec. The centrifugal acceleration is 10⁶ g (g = earth acceleration). The centrifugal forces bring the particles in contact with the foil. The greatest compactness is situated in the middle. The separated aerosols are hot particles. The determination of one particle-group was hitherto not possible. Hot particles manifest their presence not by their great masses, but by their high activity. *Subject Headings:* 1. Aerosol analysis 2. Aerosol radioactivity determination.—A. V.

12.2-76

551.510.7 550.378(94)

Marsden, Ernest (*Royal Cancer Hospital, London*), *Radioactivity of soils, plant ashes and animal bones*. *Nature*, London, 183(4666):924-925, April 4, 1959. 2 tables, ref. **DWB**—Tabulated data from the measurements of α -ray activities of bones of animals used to graze on natural α -active soils in Australia are given. The study is conducted by the Institute of Cancer Research and includes the possible influence of superphosphate on plants and the subsequent animal uptake of radioactivity. Some rock-phosphates are tabulated for their α —is considered also. *Subject Headings:* 1. Radioactive soil 2. Australia.—W. N.

12.2-77

551.510.721:628.1

Van de Vloed, A., *Quelques expériences personnelles relatives à la détermination de la radio-activité dans l'eau*. [Some personal experiences concerning radioactivity determination of water.] *La Technique de l'Eau*, Brussels, 14(157):13-17, Jan. 15, 1960. 2 figs. **NN, ICJ**—After some general observations on radioactivity and the dangers presented by radio-isotopes for the development of the future generations, the author examines particularly the problem

created by the pollution of Belgian waters through radioactive waste products. The various causes of pollution encountered in Belgium are surveyed and the author comments in detail the governmental decrees determining the concentration limit of radioactive substance in the Belgian waters. *Subject Headings: 1. Radioactive fallout 2. Water pollution through radioactive waste products 3. Belgium.—A.V.*

B8. INDUSTRY

See also: Geomag. prospecting for oil and gas (Tikhonov et al.), 12.2-107; Wind damage to power lines, Niigata Prefecture (Hayakawa), 12.2-356.

12.2-78

551.556.6:69

Biggs, J. M. (*Assoc. Prof. Structural Eng., M.I.T.*), **Wind forces on structures: introduction and history.** *American Society of Civil Engineers. Structural Div., Journal*, Vol. 84, Paper 1707, July 1958. 4 p. 25 refs. "Introduction to a group of papers prepared by the Committee on Wind Forces of the Structural Div." DWB (P)—The Committee on Wind Forces presents information on aerostatic forces and aerodynamic forces that included geometric forms, shielding, position of the object in the wind stream, friction forces, size effects, vortex effect and action producing negative slope to the lift curve. *Subject Headings: 1. Wind forces on structures 2. Aerostatic forces.—N.N.*

12.2-79

551.556.3:621.548

Une éolienne géante. [A giant wind-engine.] *L'Usine Nouvelle*, Paris, 14(32):25, Aug. 7, 1958. DLC—Algiers (Africa). It is composed of a rotor driven by the wind and acts as a current-generator. The rotor is 24 m in diameter and runs at a speed of only 100 revolutions a minute, when turbine and generator run at 1000 revolutions a minute. This wind-engine will give its peak load of 100 kW for a wind speed reaching 50 kilometers an hour. *Subject Headings: 1. Wind utilization 2. Windmills 3. Algiers, Algeria.—A.V.*

12.2-80

551.556.3:551.585.5

Golding, E. W., **The economic utilization of wind energy in arid areas.** *UNESCO, Arid Zone Research*, 7:90-101, 1956. fig., 11 refs. French and Spanish summaries p. 96-100. DWB, DLC—The author discusses the criteria for determining cost of wind energy citing actual computed costs, the execution of wind surveys, and the relationship between wind speed and situation of site. The relationship of wind energy to wind speed; the economic design of wind driven machine and the utilization of wind generated energy in arid or semi-arid regions. *Subject Headings: 1. Wind energy 2. Wind energy utilization 3. Arid regions.—I.L.D.*

12.2-81

551.501.9:551.556.3:621.311.24

Ivanov, M. P., **Ispol'zovanie vetroelektricheskikh agregatov na meteorologicheskikh stantsiakh.** [Use of wind power units at meteorological stations.] *Meteorologiya i Gidrologiya*, Leningrad, No. 2:52-63, Feb. 1959. DWB, DLC—The use of wind generators of electricity as a source of electricity in isolated weather stations is discussed with special reference to the wind units VD-3.5 and VDU-3.5. These yield up to 1 kw of electricity. They are installed upon either wood or metal masts 7-8 meters high. During winter an especially frost resistant oil is poured into the reduction gear of the units. Owing to the variations in wind velocity an auxiliary electricity source is supplied by electric batteries. The condensers, the voltage and functioning of the wind generator and also the characteristics of other generators are discussed. *Subject Headings: 1. Wind generators 2. Electrical power systems.—I.L.D.*

12.2-82

551.556.3:621.311.24

Fukuoka District, Japan. Central Meteorological Observatory, **Meteorological study on the large-scale generation of electricity by wind power, Pt. 1.** Its *Memoirs of Industrial Meteorology*, 19(1):51-70, Dec. 1955. 10 figs., 9 tables, eqs. In Japanese; English summary p. 69-70. DLC—This paper reports the results of meteorological investigations in Japan on large-scale generation of electricity by wind power. The equation used to compute the

wind power energy is $E = K\rho V^3\pi r^2$, where E =wind energy of wind perpendicular to a unit area in unit time; ρ =density of the air; V =wind speed; r =radius of the windmill and K =coefficient. Data are calculated for mean wind speed (cube factor), diurnal change of wind speed, wind speed distribution (mainly from Kyushu District) and duration of wind speed. The cube factor is generally larger than 1. Diurnal changes of wind speed frequency are calculated for Mt. Seburi and Mt. Kirishima. The wind speed duration is often cut off because of the wind speed change, but the amount of available energy is large at night. Tables are prepared of wind speed distribution to be used in the wind power utilization. The maximum of annual mean wind speed is assumed to be 16 m/s. The annual mean wind speeds are divided into 14 grades of 3~16 m/s at intervals of 1 m/s and the wind speed distribution is estimated separately for each grade. This will be applicable everywhere in Japan. Where the annual mean wind speeds are equal, the wind speed distributions are nearly the same. Duration of wind speed is determined by the total hours of the wind speed V_i m/s or more and estimated from the data of Mt. Seburi, Mt. Unzen and Mt. Fuji. *Subject Headings: 1. Wind utilization 2. Wind power 3. Wind energy 4. Japan.—A.V.*

12.2-83

551.556.3:631.67

Ramiah, R. V., **Some problems in the utilization of wind power in India.** *UNESCO, Arid Zone Research*, 7:102-107, 1956. 10 refs. French and Spanish summaries p. 105-106. **DWB, DLC**—An account is presented of the results of early experiments carried out in 1902 in Madras on the use of a windmill to raise water for irrigation, of experiments involving the setting up of windmills in Mysore in 1936 (Hebbal near Bangalore), of the data resulting from the windmill set up in 1929 at Coimbatore, of the performance of the windmill in Poona, etc. The following subjects are considered: the use of windmill power as a source of irrigation water, the selection of sites for experiments on windmills, the estimated power developed in water lifted, etc. *Subject Headings: 1. Wind utilization 2. Windmills 3. Irrigation 4. India.—I.L.D.*

12.2-84

551.515.2:551.542:551.552:551.577.37

Gilman, Charles S. and Myers, Vance A., **Winds and pressures in hurricanes.** *Conference on Coastal Engineering, 6th, Univ. of Florida, Dec. 1957, Proceedings*, pub. 1958. p. 1-18. 12 figs., 17 refs. **DWB** (627 C748pr)—Some pertinent information on surface winds and pressures have been summarized. The paper treats also rainfall in hurricanes. This is of interest in the study of floods produced by rainwater behind seawalls and in estuaries. Factors that have initiated past hurricanes in the U. S. are summarized. *Subject Headings: 1. Hurricane pressure data 2. Hurricane rainfall data 3. Surface wind data.—N.N.*

B9. RADIO COMMUNICATION

See also: Scatter wave propagation interference (Fitch), 12.2-198; *VHF scatter signals* (Hagfors), 12.2-199.

12.2-85

621.314.7.086.1

Vogel, Jakob S. and Strutt, Max J. O., **Durchführung und Diskussion von Lebensdauer-Vergleichsmessungen an europäischen NF-Transistortypen verschiedenen Fabrikates.** [Discussion of comparison measurements of the storage life tests of European NF-transistors from different origin.] *Archiv der Elektrischen Übertragung*, Stuttgart, 14(3):121-131, March 1960. 16 figs., 22 refs. German and English summaries. **DLC**—The different possible transistor life tests are discussed. Measurements on six equivalent European germanium-nf-transistor types with various storage life tests and operation life tests are recorded and the aging effects, i.e., the changes in characteristic data are commented on. The discussion deals with the spread between the data of the individual units, the worst units and the "median"-values. Special attention is paid to the "Creep" of the values to be measured and to the so-called "48 Hour Effect" as well as to the ensuing measuring difficulties. Finally, a summary of the most important conclusions is given. *Subject Headings: 1. Transistors 2. Transistor sensitivity.—Authors' abstract.*

12.2-86

621.396.677.6

Baur, Karl, **Zur Theorie des allgemeinen Adcocks**. [Stationary Adcock direction finder theory.] *Archiv der Elektrischen Übertragung*, Stuttgart, 14(1):1-14, Jan. 1960 and 14(2):57-70, Feb. 1960. 23 figs., eqs. French and English summaries p. 1. **DLC**—This paper presents the theory of the stationary Adcock direction finder in such a comprehensive and general manner that all possible cases encountered in the field can be handled. For this purpose the first sections outline a basic concept of a very general and widely variable content. Some simple well-known examples for the case of Adcock direction finder with vertical dipoles show the ease and the ease with which this method solves the problems. With the aid of the basic concept, the last five sections discuss Adcock problems that differ widely from each other and so prove the wide compass of the method employed. *Subject Headings: 1. Stationary Adcock direction finder theory.—Author's abstracts.*

12.2-87

621.396.8

Sawchuck, Walter, **Instrumentation for the automatic measurement of changes in phase height and amplitude of pulsed radio signals**. Pennsylvania. State Univ. Ionosphere Research Lab., Contract AF 19(604)-4563, Scientific Report No. 117, March 1, 1959. 133 p. 82 figs. (incl. photos), 13 refs., 3 eqs. **DWB**—This report contains a description of equipment that was designed and built for automatically measuring changes in phase and amplitude of a pulsed radio-carrier wave. The design of the phase part of the equipment is based on the null principle of servo-mechanics. Phase angles can be read to four degrees. Sensitivity can be increased to one degree by a simple change of gear ratio. Amplitude is measured by peak detection of gated echo pulse. Phase and amplitude information is presented separately on a dual channel pen recorder. Present equipment operates at a carrier frequency of 60 kc/sec, but can be easily adapted to any other frequency by using 60 kc/sec as an Intermediate Frequency. The components comprising the recording system are given in complete detail. This is done with block diagrams, schematics, graphs and photographs. Alignment and testing procedures are included. Photographs of data samples are enclosed. *Subject Heading: 1. Automatic measurement of pulsed radio signals.—Author's abstract.*

12.2-88

538.56

N. Y. Univ. Washington Square College. Mathematics Research Group, **Theoretical studies on the propagation of electromagnetic waves, including problems of reflection, refraction and diffraction**. Contract, AF 19(122)-42, Progress Report, Jan. 1-March 21, 1951. 26 p. figs., refs., eqs. **DWB** (538.3 N532t)—This report summarizes the research activities in the theory of electromagnetic propagation by the Mathematics Research Group of Washington Square College of Arts and Science associated with the Institute for Mathematics and Mechanics at New York University for the ninth quarterly period under Contract No. AF-19(122)-42. During this period three Research Reports were submitted. Abstracts of these reports are included. A complete listing of the reports, publications and other scientific activities of members of the group in connection with work done under this contract is included in Sec. 2. Activities in connection with publication of the Proceedings of the Symposium on the Theory of Electromagnetic Waves sponsored jointly by the University and the Geophysical Research Directorate are described in Sec. 2.4. In Sec. 3 the status of current research activities are discussed. Various administrative measures are detailed in Sec. 4. *Subject Heading: 1. Electromagnetic wave propagation.—Authors' abstract.*

12.2-89

551.510.52:551.510.62:621.396.8

Gough, M. W., **Diurnal influences in tropospheric propagation**. *Marconi Review*, London, 21(131):198-212, 1958. 8 figs., 14 refs. **DLC**—The existence of diurnal variations in the signal strength of very short waves has considerable scientific interest. As is now well appreciated, the basic cause of these variations is the nocturnal cooling of heated land by radiation when the sky is clear, which gives rise during the night and early morning to pronounced atmospheric stratification near the ground. After a brief historical survey of observations of these effects, this article appraises the results of 80 Mc/s signal strength recordings maintained for six months over a 137 km nonoptical path in the Persian Gulf, where the phenomenon occurred to a noteworthy degree. Modified refractive index profiles derived from selected

upper air soundings made near the radio path have shown a clear association between (a) very weak signals and an approximately standard atmosphere and (b) very strong signals and the presence of pronounced elevated or ground-based inversion layers. Measured and theoretical signal strengths are compared on the basis of a uniformly graded atmosphere, reflection at an idealized elevated inversion layer, and propagation within a duct as treated by BOOKER. Finally, an analysis is made of M-profiles exhibiting the presence of ground-based ducts, which were found to be associated with high signal levels over the test path. It is shown that in twelve out of nineteen instances, trapping of the first transmission mode was taking place on a wave length of 3.75 m. These observations, made in exceptional climatic conditions, provide evidence of recurrent nocturnal trapping on a wave length which is perhaps longer than has hitherto been considered possible. *Subject Headings: 1. Tropospheric radio wave propagation 2. Radio field strength variations 3. Persian Gulf.—Author's abstract.*

12.2-90

551.510.62:551.510.52

Isted, G. A., **Marconi and tropospheric scatter.** *Marconi Review*, London, 21 (129):41-42, 1958. **DLC**—Several cases are cited from *Marconi Review* of 1933 where beyond-the-horizon reception of microwaves (30-600 mc) was achieved by MARCONI in the Rome-Castel Gandolfo transmission route (mountains intervene), from Sardinia to the Italian mainland (270 km or 8 times optical distance) and from the steamer "Elettro" in the Mediterranean to Santa Margherita on the Italian Riviera (250 km or 9 times optical distance). The assumption made by MARCONI was that there was a stratification below the ionosphere (i.e., the troposphere) that would account for this nonoptical transmission. *Subject Headings: 1. Tropospheric radio wave propagation 2. Marconi's tropospheric radio wave propagation experiments 3. Mediterranean Coast, Europe.—M.R.*

12.2-91

551.508.822:551.510.62

Clinger, A. H. and Straiton, A. W. (both, Univ. Texas), **Adaptation of the radiosonde for direct measurement of radio refractive index.** *American Meteorological Society, Bulletin*, 41(5):250-252, May 1960. 2 figs., 6 refs., 2 eqs. **DWB**—This paper describes a technique for converting a radiosonde for direct measurement of radio refractive index of air using standard meteorological sensors. Although limited by the response time of the sensors, this device would provide for continuous and direct measurement of refractive index to an accuracy satisfactory for many radio applications. *Subject Headings: 1. Radio refractive index measurement 2. Radiosonde measurement of radio refractive index.—Authors' abstract.*

12.2-92

551.509.21:551.510.62

Jehn, K. H., **Use of potential refractive index in synoptic-scale radio meteorology.** *Journal of Meteorology*, Boston, 17(3):264-269, June 1960. 8 figs., 3 refs., 6 eqs. **DWB, DLC.** Also issued as: Texas. Univ. Electrical Engineering Research Lab., Contract AF 19(604)-2249, Report No. 6-29, Sept. 15, 1959. 10 p. 8 figs., 3 refs., 6 eqs. **DWB (M94.7 T355r)**—The concept of potential refractive index is examined in the light of earlier work and of the present emphasis on synoptic-scale radio meteorology. A new potential refractive index is defined and illustrated. It is concluded that the new parameter has operational utility in long range microwave radio and radar transmission, as well as in refractive index mapping. An example is worked out and illustrated with synoptic charts, refractive index charts, cross sections and radiosonde refractive index diagrams for the cold-wave of Feb. 19, 1952 in Northern and Central Plains of the U. S. *Subject Headings: 1. Refractive index 2. Radar synoptic analyses.—Author's abstract and M.R.*

12.2-93

551.510.62:551.501.8

Moler, William F. (U. S. Navy Elec. Lab.), **Macro- and meso-scale meteorological effects upon microwave trans-horizon fields.** *Weather Radar Conference, th, Miami Beach, Florida, Nov. 17-20, 1958, Proceedings*, issued 1958. Sec. E:26-33. 7 figs., 7 refs. **DWB (M01.81 R124pc)**—Results of correlations between X and L band microwave signal strengths and meteorological parameters are presented. Median signal strengths over periods of the order of days are best correlated with the macro-scale middle and upper tropospheric flow. Short-

term large-scale fluctuations of trans-horizon electromagnetic fields are often observed during apparently, spatially-homogeneous, time-stationary macro-scale synoptic regimes. A meso-scale analysis shows that these fluctuations occur concurrently with minor perturbations developing over or moving across the radio links. *Subject Headings: 1. Radar signal strengths 2. Radar macro- and meso-scale analyses.—Author's abstract.*

C. ASTRONOMY AND ASTROPHYSICS

1. ASTROPHYSICAL INSTRUMENTS

12.2-94

621.396.633:522.2

Penfield, Hays (*Ewen-Knight Corp., Needham, Mass.*), **A phase tracking interferometer.** *Institute of Radio Engineers, N. Y., Proceedings*, 46(1):321-325, Jan. 1958. 7 figs., table, 3 refs., 4 eqs. **DLC**—A series of radio telescope receivers has been developed to operate in a switched interferometer system of the type described by RYLE. The new features of the equipment include automatic tracking and recording of the phase difference of a coherent signal at the two receiver input terminals. Chart recorded outputs of total power, signal power, and signal phase are provided. The receiver utilizes dual low-noise rf amplifiers with a high degree of frequency selectivity. Fixed delay lines are available in both receiver channels to allow operation on the higher order lobes of the interference pattern. Front panel controls include a precision gain control, a receiver bandwidth selector, manual and automatic phase tracking controls, and signal power and total power integration time constant switches. Background and signal noise sources are provided for direct calibration of the receiver. Three of these receivers are currently in operation on frequencies of 53 mc, 108 mc, and 470 mc in a two-antenna drift interferometer at the National Bureau of Standards Laboratory in Boulder, Colo. *Subject Headings: 1. Interferometers 2. Radio telescopes.—Author's abstract.*

12.2-95

535.417

Ring, J. and Woolf, N. J., **Utilisation de l'interféromètre Fabry-Perot en Astronomie.** [Utilization of the Fabry-Perot interferometer in astronomy.] *Journal de Physique et le Radium Paris*, 19(3):354-357, March 1958. 5 figs., 5 refs. French and English summaries p. 354. **DLC**—The Fabry-Perot interferometer is compared with the diffraction grating and its astronomical uses at three different resolving powers are discussed: 1) Monochromatic photography through interference filters. A description is given of two optical systems designed to increase the photographic speed of a large telescope whilst correcting its aberration. 2) Photoelectric spectrometry of stars with $R \approx 5,000$. The gain of luminosity is shown to depend on seeing conditions. An interferometer is described which uses high-pressure scanning and gases of high refraction. 3) Design of a spectrometer for $R \geq 100,000$ using a grating and Fabry-Perot scanned simultaneously by pressure. The technique of photoncounting is recommended. *Subject Heading: 1. Fabry-Perot interferometer.—Authors' abstract.*

12.2-96

551.508.25:551.521.67:621.396.8

Wild, J. P. and Sheridan, K. V. (*both, Radiophysics Lab., CSIRO, Sydney, Australia*), **A swept-frequency interferometer for the study of high-intensity solar radiation at meter wavelengths.** *Institute of Radio Engineers, N. Y., Proceedings*, 46(1):160-171, Jan. 1958. 15 figs., 23 refs., 15 eqs. **DLC**—The paper describes an interferometer which has been constructed for studying the various spectral types of solar activity at meter wave lengths. The instrument is a "swept-frequency" interferometer and is capable of measuring the one-dimensional position and angular size of a transient source of the sun's disk, and of determining the polarization and intensity of the received radiation. Some preliminary observations have given an indication of the spectrum of source size for activity of spectral Types I and III. In both cases the angular size is found to decrease from about 10 min. of arc at 45 mc to about 6 min. of arc at 65 mc. *Subject Headings: 1. Solar radio interferometers 2. Solar radio radiation observations.—Authors' abstract.*

12.2-97

778.5:523.741

Loughhead, R. E. and Burgess, V. R. (both, Div. of Physics, C.S.I.R.O., Univ. Grounds, Chippendale, N. S. W.), **High resolution cinematography of the solar photosphere.** *Australian Journal of Physics*, Melbourne, 11(1):35-40, March 1958. 5 figs., 6 refs. **DLC**—A description is given of a new photoheliograph designed for time-lapse cinematography on 35 mm film of any selected portion of a 20-cm color image. The interval between successive photographs can be varied from 5 to 120 sec. Air-suction devices have been incorporated to suppress bad seeing originating within the telescope. The performance of the telescope is briefly discussed and the advantages of the cinematographic technique indicated. A discussion of the effects of atmospheric seeing is given in order to emphasize the great caution needed in the interpretation of solar photographs. *Subject Headings*: 1. Cinematography applications 2. Photoheliographs 3. Photosphere.—*Authors' abstract.*

C2. ECLIPSES

12.2-98

523.78:91.04

Abetti, Giorgio, **L'eclisse totale di sole del 25 febbraio 1952.** [Total eclipse of the Sun, Feb. 25, 1952.] *La Ricerca Scientifica*, Rome, 22(8):1525-1533, Aug. 1952. 3 figs., refs. French, English and German summaries p. 1533. **DWB**—Account of the activities of the Italian expedition dispatched to Khartoum for the solar eclipse of Feb. 1952. Field installations and instruments are described and illustrated. A good photo of the corona taken at mid-totality is presented. *Subject Headings*: 1. Solar eclipse expeditions 3. Khartoum, Sudan.—*G.T.*

12.2-99

551.521.1:523.78

Ikeda, H., **Measurements of the direct solar radiation during the eclipse on April 19, 1958, at Tateno.** *Tateno, Japan. Aerological Observatory, Journal*, 6(3):107-112, Jan. 1959. 5 figs., 3 tables, 5 refs., eq. In Japanese; English summary p. 107. **DWB, DLC**—During the solar eclipse on April 19, 1958, measurements of the direct solar radiation with the silver disk pyrhelimeter were made at Tateno. Fig. 1 and Table 3 indicate the time variation of the observed amounts of solar radiation (I). In order to evaluate LINKE's (old) coefficients of turbidity (τ_0) during the eclipse, intensity of the solar radiation outside of the atmosphere (I_0) is estimated. Fig. 4 and Table 3 indicate the time variation of τ_0 . An irregular variation of τ_0 is observed near the maximum obscuration. *Subject Headings*: 1. Direct solar radiation measurements during eclipses 2. Turbidity variations 3. Solar eclipse, April 1958 4. Tateno, Japan.—*Author's abstract.*

12.2-100

551.590.24:621.396.1

Rastogi, R. G. and Sherrif, R. M. (both, Physical Res. Lab., Ahmedabad), **A note on radio field strength observations made at Ahmedabad during the total solar eclipse on 30 June 1954.** *Journal of Scientific and Industrial Research, Sec. A*, New Delhi, 14(4):159-161, April 1955. 3 figs., table. **DWB**—Solar eclipse effects on the BBC transmission at 15.07 Mc/s over the 6,800 km distance from London to Ahmedabad is discussed. Recordings were made each $\frac{1}{2}$ min. every day during June 26 to July 4, 1954 at 15.30 to 21.30 hr. I.S.T. The curves presenting 5 min. average field intensity are fairly stable except the sudden increase reaching five times the value of the 18.00-19.00 hr on June 30. This increase during the eclipse period very likely was due to decrease of the absorption mainly in F1. Graphical presentation is given for two-hop and three-hop propagation, and MUF values are tabulated. *Subject Headings*: 1. Eclipse effects on radio wave propagation 2. Solar eclipse 3. Radio wave propagation.—*W.N.*

12.2-101

523.78

Ringnes, Truls S., **Solførøkelsen 30. juni 1954.** [The solar eclipse, June 30, 1954.] *Naturen*, 78(8):226-248, 1954. 16 figs. **DLC**—The development of solar eclipses is described and illustrated. Tabulated data of occurrences from March 7, 1951 to Dec. 25, 2000 is given. Region of the total eclipse described is mapped in detail for Norway and the global path is

included. Special instruction on photography of solar eclipses include data on film, filters, times of exposure, etc. *Subject Headings:* 1. Solar eclipse, June 1954 2. Eclipse photography.—*W.N.*

C3. METEORS

See: Radio wave scattering by meteor trails (Fitch), 12.2-198; Radio wave scattering by meteor trails (Hagfors), 12.2-199.

C4. RADIO ASTRONOMY

12.2-102

551.521.67:551.593.7:523.164.32

Maltby, Per, Determination of position and polarization of sources of enhanced solar radiation 200 Mc/s. *Oslo, Universitet. Institutt for Teoretisk Astrofysikk, Blindern, Report*, No. 4, June 1958. 34 p. 15 figs., 2 tables, 15 refs., 13 eqs. DWB (M93.7 O82re)—An interferometer has been built at the Solar Observatory, Havestua, for observing the position of sources of enhanced solar radiation on 200 Mc/s. The interferometer, the method for analyzing the observations, and some sources of error are described in Pt. 1. Pt. 2 of the present paper deals with the measurement of polarization by means of three antennas, one of which is polarized orthogonally. Several sources of error are discussed. *Subject Headings:* 1. Polarization measurement 2. Interferometer observation of solar radiation sources.—*N.N.*

D. OUTER ATMOSPHERE

1. IONOSPHERE

12.2-103

551.510.535:550.38:523.7:06.45 (52)

*Japan. Science Council. Ionosphere Research Committee Catalogue of disturbances in ionosphere, geomagnetic field, field intensity of radio wave, cosmic ray, solar phenomena and other related phenomena. Its *Report on Ionosphere Research in Japan*, 12(3):397-398, Sept. 1958. Almost entirely figs., photos and tables. DWB—This Section of "Catalogue of Disturbances" gives the observational data of remarkable disturbances for the following elements: ionosphere, geomagnetic field, field intensity of radio wave, cosmic ray, solar phenomena, etc. The observations were made during solar eclipse on 19 April 1958. *Subject Headings:* 1. Ionospheric disturbances 2. Geomagnetic field 3. Cosmic radiation 4. Japan.

12.2-104

551.510.535 (914)

Hennessey, S. J. (Dir., Ionospheric Res., Manila Observ., Baguio City, Philippines), Ionosphere research at the Manila Observatory. *Philippine Studies*, Manila, 3(2):164-186, June 1955. 5 figs., ref. DLC—A popular description and explanation of the atmosphere with a brief historical survey, of the structure of the ionosphere, of the instruments (ionosonde) and of ionogram details is presented. The stratification of the earth's atmosphere, a typical ionogram, *M* and *N* reflections are illustrated. The importance of the records of ionospheric research stations, distributed over the surface of the earth to assist the Central Radio Propagation Laboratory in Boulder, Colo. in the predictions of radio paths, is emphasized. *Subject Headings:* 1. Ionospheric research 2. Manila Observatory, Baguio City, Philippines.—*O.T.*

D2. COSMIC RAYS

12.2-105

551.521.64

Heidmann, J., Rayonnement cosmique et physique solaire et interplanétaire. [Cosmic radiation and solar and interplanetary physics.] *International Council of Scientific Unions, Brussels, Ninth Report of the Study of Solar and Terrestrial Relationships*. pub. Paris, 1957. p. 105-108. DWB—A brief discussion of the origin of cosmic rays, considering the modulation of galactic cosmic rays by an active sun and the production of cosmic rays by the sun itself. *Subject Heading:* 1. Cosmic ray origin.—*E.Z.S.* ©

12.2-106

551.521.64

Trefall, Harald (*Inst. of Physics, Bergen Univ.*), **Nye resultater og aktuelle problemer i kosmisk stråling.** [Recent results and current problems in cosmic radiation.] *Fra Fysikkens Verden*, Blindern, Norway, 19(1):15-23, May 1957. This first installment contains **Pt. 1, Introduction** and **Pt. 2, Strålingen i og umiddelbart utenfor jordens atmosfære** [Radiation in and immediately beyond the earth's atmosphere]. **Pt. 3, Solens innflytelse på den kosmiske strålingen** [Solar influence on cosmic radiation]. *Ibid.*, 19(2):52-70, Sept. 1957. **Pt. 4** (and conclusion), **Den kosmiske strålingen i det interstellare rom** [Cosmic radiation in interstellar space]. *Ibid.*, 19(3):104-113, Dec. 1957. 9 figs. **DLC**—The known and unknown about cosmic radiation, its origin and nature are summed up in this attempt to review the subject at large. In Pt. 1-2 an analysis is given of radiation and its composition. The secondary radiation in the atmosphere is then discussed in terms of the soft, hard and the nuclei components, showers, spectrum of energy and variation in time of energy. Pt. 3 deals with the solar source and includes the 27-day variation, variation during magnetic storms, the 11-year period and the radiation within the solar system. Finally, the Milky Way system, propagation and life of the radiation, origin, form of the energy spectrum at extremely high energies are discussed. *Subject Heading: 1. Cosmic radiation.*—*W.N.*

D3. GEOMAGNETISM

See also: Geomag. field, 12.2-103; Geomag. yearbooks, India, 12.2-202.

12.2-107

550.380

Tikhonov, A. N.; Shakhsharov, D. N. and Rybakova, E. V., **O vozmozhnostiakh razlichenii ekvivalentnykh razrezov pri ispol'zovanii peremennyykh elektromagnitnykh polei.** [Possibility of distinguishing equivalent cross-sections by using transient electromagnetic fields.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 8:1202-1205, Aug. 1959. 7 figs., 5 refs. **DWB, DLC.** Transl. into English in the corresponding number of the *Akademiia Nauk SSSR, Bulletin of the Academy of Sciences, USSR, Geophysics Series.*—A vertical electric method of sounding with direct current is analyzed for solution of geological structural problems in the search of oil and gas deposits. This method is not considered very effective in the case of a multi-layer structure with nonconducting layers. Comparative analytical and graphical analysis is discussed with the use of alternating electromagnetic sounding with grounded electric dipole for measurement of the amplitude and phase characteristics of the horizontal component (*Ex*) of the electric field and vertical component (*Bz*) of magnetic field. The last method makes it possible to distinguish the equivalent cross sections with either electric or magnetic components of the field. *Subject Headings: 1. Geomagnetic prospecting 2. Oil prospecting.*—*N.P.S.*

12.2-108

550.382.3

Granar, Lars, **Magnetic measurements on Swedish varved sediments.** *Arkiv för Geofysik*, Stockholm, 3(1):1-40, 1959. 18 figs., 13 refs., 21 eqs. **DLC**—Remanent magnetization and anisotropy of susceptibility of the sediment in natural state have been studied on several profiles of Swedish glacial clay (age 10,000 years) and recent river deposit (age 2400-0 years). The observed magnetization vector group around the present geomagnetic field vector in a manner that suggests a secular variation of similar character as that found today. However, a quite large random as well as systematic scatter of the individual observations, probably due to influences of streaming water, sloping beds, magnetic instability at drying, etc. prevents reliable detailed conclusions to be drawn. All sediments investigated possess an excess of susceptibility in a plane, generally horizontal. Part of the anisotropy is thought to have been produced by bottom currents. A tentative explanation of this effect is advanced. The present work is a continuation of the sediment research of GUSTOF ISING (publ. 1942). *Subject Headings: 1. Magnetization of varves 2. Geomagnetic field.*—*Author's abstract.*

12.2-109

550.382.3

Nairn, A. E. M.; Frost, D. V. and Light, B. G. (*all, King's College, Newcastle upon Tyne, I.*), **Palaeomagnetism of certain rocks from Newfoundland.** *Nature*, London, 183(4661):596-597,

Feb. 28, 1959. 2 figs., 2 tables, 5 refs. DWB—Pre-Cambrian rocks collected in 1957 by members of the Durham Univ. Exploration Society at two localities, viz. Signal Hill and Blackhead on the Avalon peninsula, Newfoundland, show quite a distinct difference in mean direction. The measurement involved an astatic magnetometer method. The detailed data are tabulated, suggesting a rotation of the pre-Cambrian pole position in agreement with results of other workers referred to. Whether or not it is fortuitous, the suggested rotation is based entirely on palaeomagnetic considerations. *Subject Headings*: 1. Magnetization of rocks 2. Paleomagnetism 3. Newfoundland.—W.N.

12.2-110

550.382.3(691)

Roche, A. (*Clermont Univ., Clermont-Ferrand*) and Cattala, L. (*Tananarive Obs.*), **Remanent magnetism of the cretaceous basalts of Madagascar.** *Nature*, London, 183(4667):1049-1050, April 11, 1959. fig., 2 tables, 10 refs. WB—Analysis and magnetic stability of volcanic rock samples as collected at different locations of the island in 1958 show agreement with the present geomagnetic field. No positive conclusions are drawn. *Subject Headings*: 1. Magnetization of rocks 2. Geomagnetic field 3. Madagascar.—W.N.

12.2-111

550.380.84:629.12

Hahn, Otto T., **Messung magnetischer Feldstärken an Bord von Schiffen.** [Measurement of magnetic field intensity on board ships.] *Deutsche Hydrographische Zeitschrift* 8(2):49-58, 1955. 9 figs., table, 9 refs., 9 eqs. German, English and French summaries p. 49. DWB—Existing methods of measuring magnetic field intensity by swinging ships are discussed. New methods depending on induction processes are described. *Subject Headings*: 1. Magnetic field measurement 2. Compass correction.—C.E.P.B.

12.2-112

550.382.3

Roche, Alexandre, **Sur l'aimantation de laves miocènes d'Auvergne.** [The magnetization of the Miocene lavas of Auvergne.] *Académie des Sciences, Paris, Comptes Rendus*, 250(2):377-379, Jan. 11, 1960. 6 refs. DWB, DLC—Studies of outflows dating from the Upper Miocene were made in the Cantal Department and Limagne region. The magnetization directions found are almost the same, and differ greatly from those pertaining to more recent formations and also from those of the older Oligocene. These results are compared with the results obtained by other investigations for the Japanese lavas of the same era. *Subject Headings*: 1. Magnetization of lavas 2. Miocene periods 3. Auvergne, France.—A.V.

D4. AURORAS

See: Bibliog. on Auroras, p. 339.

E. SOLID EARTH GEOPHYSICS

1. GENERAL GEOPHYSICS

12.2-113

551.465:525.6 551.543:525.6

Groves, Gordon W., **Tides.** *California. Univ. Scripps Institution of Oceanography, Contributions*, 1958, issued Nov. 1959. p. 59-71. 7 figs., 3 tables, eqs. "Reprinted from *Encyclopaedia Britannica*, 1958" (original paging not given). DWB (551.46 C153co 1958)—The word tide refers to those alternating relative motions of the matter of a planet, satellite or star, which are attributed to the gravitational actions of external bodies. Such motions are known to occur in all three principal divisions of the earth. The alternating slight changes of shape of the solid body or lithosphere of the earth attributed to the gravitational action of the moon and sun are known as bodily tides. Similarly, there are the atmospheric tides in the atmosphere, and the familiar ordinary ocean tides in the hydrosphere. A still wider use of the word is based on descriptive instead of on causal and astronomical ideas, and takes for its criterion that the motions in question have certain features in common with ocean tides. This extension includes those long waves of the sea, or tsunamis, which are sometimes caused

by earthquakes, as well as effects on the sea of variable atmospheric pressure and wind, known as meteorological tides. In this article tides will be considered under these sections: I. Ordinary tides; II. History of the study of tides; III. Tide-generating forces; IV. Dynamics of ocean tides; V. Actual tides in the ocean; VI. Tidal analysis and prediction; VII. Nonastronomical variations of sea level; VIII. Miscellaneous tidal problems; IX. Atmospheric tides; X. Bodily tides.—*Subject Heading: 1. Tides.*

12.2-114

551.1:551.24:550.34

Barnier, Lucien, **La structure du Globe**. [Structure of the Globe.] *Geographia*, Paris, No. 88:2-12, Jan. 1959. 7 figs., 2 color-photos. **DLC**—Short survey of recent investigations made on internal structure of the Globe based on study of volcanoes and on measurements of seismic waves produced through natural and artificial earthquakes. Information supplied by earthquakes, and summary of the various theories suggested about drift of continents are included. *Subject Headings: 1. Internal structure of the globe 2. Seismic waves 3. Drift of the continents.—A.V.*

12.2-115

551.14:551.24

Meijering, J. L. and Rooymans, C. J. M., **On the olivine-spinel transition in the earth's mantle**. *Akademie van Wetenschappen te Amsterdam. Proceedings of the Section Sciences, Ser. B*, 61(5):333-344, 1958. 5 figs., 15 refs. **DLC**—The authors show that the treatment of the mantle as a one-component system is unsatisfactory for interpreting the limits of the transition zone. A treatment based on the binary system $\text{Mg}_2\text{SiO}_4\text{-Fe}_2\text{SiO}_4$ is much better in this respect, but fails in predicting further details, namely, the distribution of the volume effect over the zone. Unless the "experimental" data for this distribution are discarded as too uncertain, the system must be treated as being at least ternary, which it probably is. Then fair agreement can be expected in a plausible way. The loss of balance between rising and subsiding columns in the convection currents would presumably be a gross effect. Integrated over the transition zone the specific heat and volume effects depend only on the conditions at the boundaries of this zone and not on the course of the transformation in it. Thus the treatment of the mantle as a system of more than one component does not appear to entail difficulties in this respect. Another essential point is that if the heat of transformation is larger than about 100 cal/gram, convection currents cannot be expected to break through the transition layer. NIEUWENKAMP's estimate that the heat of transformation will be smaller, probably even less than 25 cal/gram, agrees with the estimate of the authors of the transformation entropy. VENING MEINESZ' conclusion that the transition layer is a strong source of instability in the mantle, leading to convection currents, is therefore not affected by this paper. *Subject Headings: 1. Earth's mantle 2. Olivine-spinel transition 3. Heat transformation 4. Entropy transformation.—Authors' abstract.*

E2. GEODESY

12.2-116

551.242

†Alterman, Z.; Jarosch, H. and Pekeris, C. L., **Oscillations of the earth**. *Royal Society of London, Proceedings, Ser. A*, 252(1268):80-95, Aug. 25, 1959. 5 figs., 5 tables, 21 refs., 60 eqs. **DWB, DLC**—A study is made of the free and forced oscillations of the earth. The natural periods are determined for radial, torsional and spheroidal types of oscillation. Several models of the earth are used: a homogeneous model, such as was assumed originally by LOVE, a model consisting of a homogeneous solid mantle enclosing a homogeneous liquid core, Bullen's model B, and Bullard's models I and II. It is found that the spheroidal oscillation of order 2 has a period of about 53.5 min in all models, except the homogeneous one, for which this period is only 44.3 min. The common period of 53.5 min agrees to within the observational error with the period of 57 min observed by BENIOFF on the seismograms of the Kamchatka earthquake of 1952. In contrast to all the other models, Bullen's model B possesses an additional spheroidal oscillation of order 2 of a period of 101 min. The latter oscillation is confined mainly to the core, its amplitude in the mantle being relatively very small. BENIOFF's observation of a second oscillation of a 100 min period in the Kamchatka earthquake record might be considered as evidence favoring Bullen's model B. The latter differs from Bullard's models

mainly by having a central density of around 18 instead of about 12 g/cm³. However, a theoretical investigation of the relative excitation of the various free modes by an impulsive compressional point-source situated at a shallow focal depth, shows that the amplitude of the 100 min oscillation should be more than 1000 times weaker than that of the 53.5 min oscillation. It is thus not clear how a near-surface earthquake could have excited the core-oscillation. The spectrum of the free modes of oscillation has also been determined for $n=3$ and 4, including the fundamental and the first two overtones for each case. The computed free periods of spheroidal oscillation range from 53.5 min down to a period of 8 min for the fourth overtone in the case $n=2$. We have also treated the bodily tides for Bullen's and Bullard's models. Love's numbers were determined in the case $n=2$ for tidal periods of 6, $6\sqrt{2}$, 12 h and ∞ . The dependence of the Love numbers on the period is small, a maximum range of variation of 13% occurring in the k -values between the periods of 6 h and ∞ . *Subject Headings: 1. Oscillations of earth 2. Tectonic processes 3. Models of earth.—Authors' abstract. ⑤*

12.2-117

551.242

†Gilbert, Freeman and MacDonald, Gordon J. F. (*both, Inst. of Geophysics, Univ. Calif.*), **Free oscillations of the earth, Pt. 1, Toroidal oscillations.** *Journal of Geophysical Research*, Wash., D. C., 65(2):675-693, Feb. 1960. 13 figs., 8 tables, 32 refs., 42 eqs. **DLC**—The free periods of toroidal oscillations of the earth have been computed for two earth models. The lowest period for the Gutenberg model earth 2651 sec and for the Jeffreys-Bullen model 2732 sec. The surface amplitudes of the oscillations have been computed for three kinds of delta function stress sources—a unit force, a unit couple, and a unit torque—at depths of 600, 250, 100 and 30 km. The amplitudes decrease with increasing depth of the source. For a unit couple at 600 km the maximum amplitude of the lowest period for the Gutenberg model is 1.59×10^{-26} cm, and for the Jeffreys-Bullen model it is 0.70×10^{-26} cm. By using the free periods of oscillation we have extended Love wave phase velocity and group velocity dispersion curves to include long-period Love waves. The method used to compute the periods and amplitudes of the free oscillations is an extension of the Thomson-Haskell matrix method used in plane layered media. An example is presented to show the correspondence between the free oscillations and ray theory. *Subject Headings: 1. Oscillations of earth 2. Toroidal oscillations.—Authors' abstract.*

12.2-118

550.312

Bollo, Robert; Goguel, Jean and Jaeger, Jean Louis, **Sur quelques anomalies gravimétriques en Bretagne.** [Some gravimetric anomalies in Brittany.] *Académie des Sciences, Paris, Comptes Rendus*, 246(4):622-624, Jan. 27, 1958. **DLC**—Study on the gravimetric anomalies in Brittany. The most remarkable character of these anomalies is the coincidence which they present with tertiary rocks indicated by geological charts. The gravimetric characters of the anomalies seem to be only explicable through the presence, at a very slight depth of a mass passably lighter than the surrounding rocks. *Subject Headings: 1. Gravimetric anomalies 2. Brittany, France.—A.V.*

12.2-119

551.5:531.51

Woollard, George P.; Rose, John C. and Ault, Wayne, **A study of methods for measuring large changes in gravity on an inter-continental basis (Supplement).** Woods Hole Oceanographic Institution, Contract AF 19(604)-585, Technical Report [unnumbered], Dec. 1, 1954. 18 p. 4 figs., 6 tables. **DWB**—Known and possible sources of error in the 1951 program of gravity measurements carried out with the quartz pendulums of the Gulf Research and Development Co. are discussed and re-evaluated. In particular, the correction applied for the effects of ionospheric disturbances on WWV time signals are restudied. It is concluded that apparent changes in signal travel time for great distances were in reality related to distortion of the WWV 1000 cycle marker pulses which resulted in delay in the firing of the strobotron circuit used to establish the chronometer rate. The pressure corrections are also restudied and certain anomalous values observed for the "zero" on the manometer which originally were regarded as fictitious and accredited to mercury meniscus errors are accepted as real. Comparisons of these revised data with provisional results obtained with another set of Gulf quartz pendulums in 1953 and with the results obtained by the Dominion Observatory of Canada

with the Cambridge University pendulums in 1952 and 1953 show that all data are in essential agreement, except where obvious tares (jumps in readings) are present. The locations at which these tares were incurred are brought out by comparisons of results with those for recent gravimeter measurements taken at the same observation sites. *Subject Heading:* 1. Gravity observations.—*Authors' abstract.*

12.2-120

526.91

Gigas, Erwin (*Frankfurt a.M.*), **Messtechnische Fragen der Geodäsie.** [Problems of measurement technique in the field of geodesy.] *Zeitschrift für Instrumentenkunde*, Brunswick, 67(3):45-48, March 1959. DWB—The problem is discussed and is classified into (1) classical distance measurement of high accuracy; (2) optical distance measurements; (3) electronic measurement of distance and (4) measurement of distance by application of ultrasonics. *Subject Heading:* 1. Geodesy measurement techniques.—*W.N.*

12.2-121

550.383:551.521.67:525.3

Danjon, André, **Sur un changement du régime de la rotation de la Terre survenu au mois de juillet 1959.** [A change in the earth's rotation regime supervened in July 1959.] *Académie des Sciences, Paris, Comptes Rendus*, 250(8):1399-1402, Feb. 22, 1960. fig., 6 refs. DWB, DLC—For the second time since the middle of the year 1955, the earth's rotation regime has changed at a date situated around July 21, 1959. The length of the day increased briskly by 0.85 ms. Since then it has decreased by $3.7\mu\text{s}$ per day. There might be a correlation between this brisk change and the exceptionally intense geomagnetic storm on July 15. The daily geomagnetic activity had never reached such high values since the beginning of the IGY. Soundings at an altitude of 30 km have shown evidence of corpuscular currents with exceptional intensity and duration. The earth's rotational irregularities, recorded during the observation period, coincided with an exceptionally intense solar corpuscular radiation. On the other hand, the solar eruptions are attended by disturbances in the artificial satellites' movement. These effects seem to be due partly to the heating of the upper atmosphere under the influence of the solar radiation and of the decrease of density, and further to electromagnetic phenomena such as the action of the corpuscular current on the load of the satellites or on the ambient ionized medium. If the fluctuations of the day length are ruled by the corpuscular current generating activity of the sun it is most likely electromagnetism alone that will provide the explanation of these variations. *Subject Headings:* 1. Rotation of the earth 2. Geomagnetic variations 3. Corpuscular radiation.—*A.V.*

E3. GRAVITY

12.2-122

526.7

Lecar, Myron (*Physics Dept., Yale Univ.*); Sorenson, John (*Math. Dept., Purdue Univ.*) and Eckels, Ann (*Natl. Aeronautics & Space Admin., Wash., D. C.*), **A determination of the coefficient J of the second harmonic in the earth's gravitational potential from the orbit of satellite 1958 β_2 .** *Journal of Geophysical Research*, Wash., D. C., 64(2):209-216, Feb. 1959. 5 figs., 4 tables, 12 refs., 18 eqs. DLC—From the secular changes in the longitude of the node and the argument of the perigee, the coefficient J in the gravitational potential function

$$U = \frac{u}{r} \left[1 + J \left(\frac{Ae}{r} \right)^2 \left(\frac{1}{3} - \sin^2 \phi \right) + \frac{K}{30} \left(\frac{Ae}{r} \right)^4 (3 - 30 \sin \phi + 35 \sin^3 \phi) \right]$$

was determined to be $(1.6232 \pm 0.0005) \times 10^{-3}$. If the bounding equipotential surface of the earth is assumed to be an ellipsoid of revolution, this value of J implies a flattening f of $1/298.32 \pm 0.5$. *Subject Headings:* 1. Gravity measurement 2. Earth's gravity potential.—*Authors' abstract.*

12.2-123

526.7:531.51

Thompson, Lloyd G. D. (*GRD, AF Camb. Res. Ctr., Mass.*) and LaCoste, Lucien J. B. (*LaCoste and Romberg, Austin, Tex.*), **Aerial gravity measurements.** *Journal of Geophysical Research*, Wash., D. C., 65(1):305-322, Jan. 1960. 9 figs., 7 tables, 4 refs., 4 eqs. DWB, DLC—Test with an air-borne LaCoste and Romberg Sea Gravity Meter (surface type) have

shown that gravity measurements in a flying aircraft are feasible. At high altitudes the aircraft was a sufficiently stable platform for the gravity meter to operate satisfactorily. Analysis of in-flight acceleration problems has shown that gravity observations can be made at high aircraft velocities with proper flight programing and navigation systems. North, south, and west traverses over an Askania tracking range gave 5 min average gravity readings which plotted into smooth profiles. An accuracy of better than 10 mgal was obtained which meets requirements for geodetic applications where mean gravity values for $1^{\circ} \times 1^{\circ}$ squares are required. *Subject Headings: 1. Gravity measurement 2. Airplane measurement of gravity.—Authors' abstract.*

12.2-124

531.53

Jobert, Georges (*Inst. of Physics, Univ. of Paris*), **Théorie du pendule de Zöllner et du pendule de Lettau.** [Theories of the Zöllner pendulum and of the Lettau pendulum.] *Geofisica Para e Applicata*, Milan, 44:25-73, Sept. / Dec. 1959. 11 figs., numerous eqs. English and Esperanto summaries p. 25. **DLC**—The theory of a Zöllner's horizontal pendulum with perfect wires and suspension is made. We use the Euler's angles of the axes of a system fixed in the moving body relatively to fixed axes and a fourth angle characterizing the amplitude of a motion of translation. We give the conditions for the decoupling of the four types of motion (pure rotation, pitching, rolling, translation) and the equations of forced motions. A rigorous theory of Lettau's double pendulum is initiated. We suppose that the primary pendulum has only one degree of freedom. First the case of a secondary pendulum not disturbing the primary one is examined, and then the case of an indifferent primary pendulum, which enables us to understand what happens in the normal case. The potential energy of the secondary pendulum is not always a minimum in the central position when the plane of symmetry is vertical and it is possible that parasite solutions appear, stabler than the central one. This study is extended to the case of a nonvertical plane of symmetry and indications are given for the study of the free motions of the system. In conclusion we could say that this system is simple only on first sight. Its use would be necessary in the case of a real great drift of the underground of the station. But in the contrary case ordinary simple pendulums are sufficient and more easy to understand. *Subject Heading: 1. Pendulum theories.—Author's abstract.*

12.2-125

526.775

Dimitrov, L. V., **Graficheskiĭ sposob vychisleniia znacheniiĭ vtoroiĭ vertikal'noiĭ proizvodnoiĭ potentsiala sily tiazhesti.** [Graphical method of calculating the value of the second vertical derivative of gravity potential.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 4:617-620, April 1959. 3 figs., 3 refs., 7 eqs. **DLC**—Describes a method of calculating the effect of gravitational anomalies at the earth's surface. *Subject Headings: 1. Gravity calculation 2. Earth's gravity potential.—Physics Abstracts, 12885, 1959.*

E4. GEOMORPHOLOGY

12.2-126

551.311.1(22)

†Poser, Hans (Hanover), **Klimamorphologische Probleme auf Kreta.** [Problems of climatic morphology on Crete.] *Zeitschrift für Geomorphologie*, Berlin, n.s., 1(2):8-142, Oct. 1957. 8 figs., 3 tables, 41 refs. English and French summaries p. 140-141. **DWB**—The author describes the climatic morphological studies which were conducted in Crete during the summer of 1956. The results have enhanced our present day definition of climatic morphological zones and glacial times. The former depends on climatic factors. The height of the region under study was 2456 m above sea level. This periglacial region is marked by patterns of frost-dynamical origin: frost-shattered fragments, frost, polygonal soils and soils of tropical type. The limits of the region of soil formation and other patterns of cold-climatic origin were studied. *Subject Headings: 1. Climatic morphology of Crete 2. Geomorphology 3. Crete.—N.N.*

12.2-127

551.3.053:551.582.1(719)

Twidale, C. R., **Evolution des versants dans la partie centrale du Labrador-Nouveau Québec.** [Evolution of the slopes in the central part of Labrador-New Quebec.] *Annales de*

Géographie, Paris, 68(365):54-70, Jan./Feb. 1959. 9 figs., 4 photos, 2 tables, 34 refs. **DLC**—First part of this study deals with geographical location of the central part of Labrador, which possesses inclement climate with long lasting and hard winters, and is characterized by a great daily mean oscillation of temperature and moderate precipitation, one half of this being snow. In the second part, author surveys the morphology of the two main types of slopes and in the third he discusses the theory of slope development. He deals successively with nomenclature, development of upper slope, rock bluff, slopes of debris, debris-clad slopes, etc. This type of evolution depends entirely on the system of erosion and transport, which in its turn depends on climate. Low temperatures of this region have a determining influence on the weathering of rocks and on the transport of debris in the central part of Labrador-New Quebec. In his conclusions, author summarizes the main features about development of slopes. *Subject Headings*: 1. **Geomorphology** 2. **Slope evolution, Central Labrador** 3. **Low temperature influences** 4. **Labrador, Canada** 5. **New Quebec, Canada.**—A.V.

12.2-128

552.43:548.53 551.253

†Collette, B. J., *On the origin of schistosity*. *Akademie van Wetenschappen, Amsterdam, Proceedings of the Section of Sciences, Ser. B*, 61(2):121-139, 1958. 2 figs., 27 refs. **DLC**—In the first communication, the author describes mechanical orientation and the orientation by recrystallization (Riecke's principle). He gives a summary of results (Daubrée's experiment) and a theory of schistosity. The second part deals with the orientation of schistosity planes in folded structures. It seems possible to explain the origin and the distribution of schistosity by a combination of rotation as a result of plastic flow and of recrystallization, if the elastic anisotropy governs both processes. The same processes will work on other crystals occurring in geological structures. *Subject Headings*: 1. **Geology** 2. **Mechanical orientation** 3. **Theory of schistosity.**—A.V.

12.2-129

551.583.3:551.4

†Rulikowska, Joanna and Manikowska, Barbara, *Geomorfologiczne znaczenie litologii*. [Geomorphic importance of lithology.] *Czasopismo Geograficzne*, Warsaw, 25(4):346-358, 1954. 25 refs. French summary p. 357-358. **DWB, DLC**—Geomorphology studies the relief of the earth's surface as a function of climate, time and rock structure. The lithology is an important part of the latter. Denudation and sedimentation depend on grain, cohesion and solubility. The type of denudation of any particular rock varies according to climate. *Subject Heading*: 1. **Geomorphology.**—C.E.P.B.

12.2-130

631.4

†Elfe, Karl-Heinz, *Die Bestimmung des Raumgewichtes von Böden und Gesteinen durch Gamma-Strahlen*. [Determination of specific gravity of soils and rocks by gamma-rays.] *Freiberger Forschungshefte, Ser. C, Geophysik*, Berlin, No. 61, 1959. 92 p. 90 figs., 60 refs. **DLC**—The article gives a statement of the basis and the measurement methods of gamma-absorption and scattering in the determination of specific gravity of soils and rocks. Diminishing the absorption coefficient μ (cm²/g) it is possible to diminish scattering influence in measurement of gamma-absorption. It was stated that specific gravity of moisture in superficial soil layers (~1 m depth) can be determined with a 1-250 precision by the gamma-absorption sounding. Importance of γ - γ measurements in boring is shown. Experiments have shown that it is possible to make measurements of specific gravity from the soil surface till a great boring depth. *Subject Headings*: 1. **Gravity of soils** 2. **Gamma-rays absorption.**—A.V.

12.2-131

551

Angino, Ernest E. (Dept. of Geology, Univ. of Kansas), *Pressure effects on thermoluminescence of limestone relative to geologic age*. *Journal of Geophysical Research*, Wash., D. C., 64(5):569-573, May 1959. 3 figs., 5 refs. **DLC**—Thermoluminescence as modified by pressure has been studied, and a relationship between pressure effects and geologic age has been observed. Experimental evidence indicates that the amount of pressure and the length of time that is applied cause a marked variation in the ratio of thermoluminescence of pressed to unpressed samples. Geologically young samples showed a greater variability in the induced time-pressure effects than did geologically older samples. The ratio of thermoluminescence

of pressed to unpressed samples plotted against the time the pressure was applied showed a systematic variation from low values through a pronounced maximum and back to intermediate values. The amplitude of this curve shows an inverse relationship to the geologic age of the sample for limestones younger than Mesozoic. *Subject Headings: A. Geology 2. Thermoluminescence of limestone.—Author's abstract.*

E5. GEOCHRONOLOGY

12.2-132

550.9:539.16:546.26

Bose, Ajay Kumar (*Indian Inst. of Tech., Kharagpur*), **Radiocarbon dating**. *Science and Culture*, Calcutta, 21(6):289-292, Dec. 1955. 8 refs. **DLC**—Processes whereby unstable C^{14} is formed in the atmosphere by collision of cosmic rays with Nitrogen ^{14} , and the disintegration with a half life of 5568 years, the world wide variations and eventual even distribution of C^{14} , total amount formed per day and remaining on earth, difficulty in measuring radiocarbon activity due to natural radioactivity and cosmic ray activity in atmosphere, age of logs, mummies, animals and archaeological remains, dating of glaciations, and earliest remains of man in America, Europe and Africa, and use in oceanography and petroleum dating are described. *Subject Heading: 1. Radiocarbon dating.—M.R.*

12.2-133

551.1

Baadsgaard, H.; Goidich, S. S.; Nier, A. O. et al., **The reproducibility of A^{40}/K^{40} age determinations**. *American Geophysical Union, Transactions*, 38(4):539-542, Aug. 1957. 3 tables, 4 refs. **DWB, DLC**—Techniques used in A^{40}/K^{40} age determinations are discussed. The reproducibility of the method as studied by replicate determinations on the same sample and on different samples from a rock unit is within five per cent of the age of the rock. A^{40}/K^{40} age determinations are given for a group of samples, and the results are compared with ages obtained in other laboratories using the same samples. *Subject Heading: 1. Age of earth's rocks. I. Hoffman, J. H.—Authors' abstract.*

12.2-134

529:551.7

Webster, R. K.; Morgan, J. W. and Smales, A. A., **Some recent Harwell analytical work on geochronology**. *American Geophysical Union, Transactions*, 38(4):543-546, Aug. 1957. 5 tables, 10 refs. **DWB, DLC**—Ages have been found by the rubidium-strontium method for the pair of meteorites (Forest City, a chondrite, and Johnstown, an achondrite) and for four lepidolites. The rubidium determinations made by stable isotope dilution are supported by neutron activation analysis. A brief mention is also made of the determination of lead in small samples of monazites by direct polarographic analysis. *Subject Headings: 1. Geochronology 2. Rubidium-strontium measurement.—Authors' abstract.*

12.2-135

550.93:539.16:546.26

Herdmenger, Johannes, **C^{14} -Altersbestimmung keine Allheilmethode. Beachtliche Fehlerquellen bei Anwendung der Radiokarbon-Methode festgestellt**. [C^{14} age determination no universal method. Considerable sources of error in application of radio-carbon method determined.] *Forschungen und Fortschritte*, 31(8):235, Aug. 1957. 9 refs. **DLC**—Two sources of error in age determinations by C^{14} are referred to. C^{14} in bones may be doubled by soil air and soil water. Geomagnetism has decreased in past 2000 years, from which it is inferred that cosmic radiation and hence C^{14} in upper atmosphere has considerably increased. Error in dating objects 4000 years old may be 1000 years. *Subject Heading: 1. Radiocarbon dating.—C.E.P.B.*

12.2-136

551.332.26:539.16:546.26

Gill, Edmund D. (*National Museum of Victoria, Melbourne*), **Radiocarbon dating for glacial varves in Tasmania**. *Australian Journal of Science*, Sydney, 19(2):80, Oct. 1956. 11 refs. **DLC**—Glacial varves near Gormanston in Western Tasmania were given a date of $26,480 \pm 800$ years, or equal to beginning of Wisconsin glaciation in N. America. *Subject Headings: 1. Radiocarbon dating 2. Varves 3. Tasmania.—M.R.*

E6. SEISMOLOGY

12.2-137

550.341:312.26

Montandon, Frédéric, *Quelle est la moyenne annuelle des morts causées par les tremblements de terre?* [What is the annual average number of deaths caused by earthquakes?] *Revue pour l'Etude des Calamités*, Geneva, 16(36):61-65, Dec. 1959. 2 tables. **DLC**—The annual total number of earthquakes for the whole of the globe is calculated between 10,000 and 30,000, but the men only feel 5000 to 6000 of them every year. This number, however, does not include more than 25 catastrophies. The first table indicates, year by year for the period of 1926-1950, the number of deaths in all parts of the world. The second table gives for the same period, the number of lives lost on account of seisms in different countries and regions. The peak numbers are 76,615 for the year 1927, and 78,802 for 1932. The author calculates that the annual average of deaths caused by earthquakes is between 14,500 and 15,000. *Subject Headings*: 1. Earthquake frequencies 2. Mortality due to earthquakes.—A.V.

12.2-138

551.506.22:550.34

Rothé, J. P. (Strasbourg University), *Tableau de séismicité du Globe pendant l'année 1957*. [Globe's seismicity table for the year 1957.] *Revue pour l'Etude des Calamités*, Geneva, 16(36):3-37, Dec. 1959. fig., tables, 31 refs. **DLC**—The International Geophysical Year has reinforced the co-operation between the stations and the International Seismological Bureau at Strasbourg. The author, who is the Director of the International Seismological Bureau, studied in 1957 3044 seisms. However, only 2201 epicenters could be determined by him. In 1957 as compared with the preceding years, the total seismic activity increased. The increase was principally due to the energy unlocked in 4 severe seisms; their magnitude exceeded 7.7 (March 9, Aleutian Islands; June 27, Siberia; July, 28, Mexico; Dec. 4, Mongolia), and in 27 seisms whose magnitude exceeded 7. The seisms are classified after the great orogenous areas: continental Europe; Mediterranean regions; Asian mountain ranges; Pacific; continental America; continental Africa; Indian Ocean and Australia. For each of these regions, a table indicates the various earthquakes observed in 1957, including date, time, co-ordinates and magnitude of each seism. For each orogenous region, the description of each seism is attended by remarks and comments. *Subject Headings*: 1. Seismology 2. Seism frequency 3. Seism intensity 4. IGY seismology program.—A.V.

12.2-139

550.342:551.515.2

Chakrabarty, S. K. (Bengal Eng. College, Howrah), *Microseismic work at the Bengal Engineering College*. *Journal of Scientific and Industrial Research, Sec. A*, New Delhi, 17(12); Special Supplement, Dec. 1958. p. 100-103. 2 figs., 2 refs. **DWB, DLC**—Perhaps the most important aspect of microseism is that associated with cyclones. The qualitative correlation known to exist between microseism and cyclonic activity can be quantitatively investigated. This could aid forecasting of storms at a very early state of their development. Brief review of some theories of this relationship and its exploitation in weather services is given and microseismic recordings of two storms are presented to illustrate the subject. *Subject Heading*: 1. Microseism-cyclone relationships.—W.N.

E7. VOLCANOLOGY

12.2-140

550.34:551.21 551.464

Chaigneau, Marcel; Tazieff, Haroun and Fabre, René, *Sur l'analyse des émanations volcaniques de l'archipel des Nouvelles-Hébrides*. [The analysis of the volcanic emanations in the New Hebrides Archipelago.] *Académie des Sciences, Paris, Comptes Rendus*, 250(10): 1760-1765, March 7, 1960. 3 tables, 11 refs. **DWB, DLC**—The New Hebrides Archipelago includes the most active seismic and volcanic part of the world. The authors present the results of a geochemical and geophysical study of the Ambryn and sub-marine volcanoes of this archipelago. The composition of gases of the Ambryn volcano permits to record a relatively constant ratio SO₂/CO₂ between the various holes. The matters in suspension in the sea water above the submarine volcanoes are different, as they are taken in the large fringe of the wave or at places of intense gaseous emissions. *Subject Headings*: 1. Seismology

2. Volcanology 3. Volcanic dust ejection 4. Sea water composition 5. New Hebrides Archipelago.—A.V.

12.2-141

551.21:551.510.42(675)

Du Bois, C. G. B., **Recent volcanic activity in the Kivu District, Belgian Congo.** *The Uganda Journal*, Kampala, 23(2):118-123, Sept. 1959. 4 photos, chart.—Report on the volcanic activity from 1956 to 1958 in the Kivu District, Belgian Congo. The area between Lake Bunyoni (SW Uganda) and the N.E. shore of Lake Kivu forms a single geological unit containing more volcanoes than any other part of Africa. The author treats the westward movement of the focus to its present position and discusses the possibility of an eastward movement. The main eruption of Aug.-Sept., 1958 north of Nyamulagira and the damage caused to men, vegetation, cattle and topsoil are described in detail. The temperature at the time of emission reached 1030-1050°C. The lava was kivite of very low viscosity; it covered 18 km in 21 days with a daily rate of flow of 4 million m³. The gas, consisting mainly of water vapor with large amounts of sulphur dioxide, carbon dioxide and some hydrogen sulphide and sulphur trioxide, was emitted in such enormous quantity that it condensed and gave rise to a continuous acid rain which had a pH of 3.5. Acid rain carried westward for a distance of 12 to 15 miles destroyed plantations and gardens. Fine ash and Pele's hair contaminated pastures. 2000 cattle had to be moved and export was stopped. Finally, measuring of gas seepages is shown to be a method of estimating the growth of excessive crustal pressures which precede a volcanic eruption. A sketch map showing distribution of volcanoes in the boundary region of Belgian Congo-Uganda, and colored photos taken after the eruptions are presented. *Subject Headings:* 1. Volcanic activity 2. Volcanic dust 3. Kivu District, Belgian Congo.—A.V.

12.2-142

551.21:551.73(442.6/8)

Bouroz, Alexis, **Découverte de roches volcaniques dans le socle paléozoïque du Nord de la France.** [Discovery of volcanic rocks in the Palaeozoic shelf of northern France.] *Académie des Sciences, Paris, Comptes rendus*, 248(18):2611-2613, May 4, 1959. DWB, DLC. Four recent borings made in the region of Doullens (Somme) revealed intrusive rocks and volcanic outflows (rhyolites, andesites, basalts and tuffs) in the Palaeozoic. The age of the outflow is very likely stephanopermian or perhaps slightly anterior. *Subject Headings:* 1. Geology 2. Volcanic outflow 3. Palaeozoic era 4. Northern France.—A.V.

12.2-143

551.525.4:536.21

*†Schössler, Klaus and Schwarzlose, Jobst, **Geophysikalische Wärme fluszmessungen.** [Geophysical heat flow measurements.] *Freiberger Forschungshefte, Ser. C, Geophysik*, Berlin, No. 75, 1959. 120 p. 46 figs., 19 tables, 95 refs. DLC—The article deals with most of the problems concerning the origins of heat; the heat conductivity and convection currents. Conclusions have been drawn about the distribution of radioactivity and the corresponding heat flow. Geological and geophysical theories showing the importance of heat flow coming from inside the earth are discussed. Geothermal gradient and conductivity capacity are discussed, also the possibilities for measurements. The authors review the different measurements of geophysical heat flow. For the D.D.R. the Erz Mountains are the region with high heat flow, in other regions heat flow is 30% lower but always above the mean value: $1.2 \cdot 10^{-6}$ cal/cm²s. For the European continent results from Hungary, the Alps, the D.D.R. and a valuation for Poland have been published. *Subject Headings:* 1. Heat flow in the earth 2. Heat conductivity.—A.V.

12.2-144

551.16

†Båth, Markus, **Jordkärnan: ett aktuellt geofysiskt problem.** [The earth's core: a modern geophysical problem. *Uppsala. Universitet. Meteorologiska Institutionen, Meddelande*, No. 45, 1955. p. 15-43. 6 figs., table, bibliog. p. 38-41. In Swedish; English summary p. 41-43. DLC—Current (1952) knowledge of the physical properties of the earth's core is summarized and the principle parameters shown graphically (according to various authorities). For instance, the temperature from the surface to 600 km depth, according to GUTENBERG, HOLMES,

ADAMS and JEFFREYS differ considerably; the first author showing a marked discontinuity at 80 km and a temperature at 600 km of 1800° or about half that which the 3 last authors would obtain by smooth curves. The 3 main theories are (1) the Wiechert (1897) iron core theory, (2) the Kuhn and Rittmann (1941) theory that it consists of solar material, mostly hydrogen and (3) the Ramsey (1948-49) theory that discontinuities are due to phase transition under high pressure from molecules to metallic phase. The Ramsey theory has the fewest objections. *Subject Headings: 1. Geophysics 2. Earth's core theories.—M.R.*

12.2-145

551.14

Dergunov, I. D., *Sovremennoe predstavlenie o termicheskom rezhime zemnoi kory.* [Contemporary ideas on the thermal regime of the earth's crust.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 1:65-74, Jan. 1958. 2 figs., 3 tables, 13 refs., eqs. **DLC.** Transl. into English in the corresponding number of the *Akademiia Nauk SSSR, Bulletin of the Academy of Sciences, USSR, Geophysics Series.* **DLC**—The author reviews various hypotheses and investigations on the sources and distribution of heat in the earth's crust and in the earth as a whole. The results of various measurements are presented and a map showing the geographic distribution of places where heat flow has been determined is reproduced. The thermal regime of the earth's crust is explained by radioactive decay. The principal difficulty encountered in solving various problems of the thermal regime of the earth's crust is the result of ignorance of the depth of distribution of the radioactive elements, the variation of their concentration with depth and the variation of concentration of radioactive elements in the entire earth during the past and present. *Subject Headings: 1. Thermal regime of earth's crust 2. Radioactive decay.—I.L.D.*

1.2-146

550.361

Jacobs, J. A. and Allan, D. W., *The thermal history of the earth.* *Nature*, London, 177(4500):155-157, Jan. 28, 1956. 5 figs., 8 refs. **DWB**—Calculations at the University of Toronto of temperature and heat flow in various earth models (non-radioactive and radioactive) at different depths and times are plotted. All indicate that temperature has increased during geological time, at depths of 500 km or more, but decreased at depths of 50-100 km. *Subject Heading: 1. Earth's internal heat.—C.E.P.B.*

12.2-147

550.361

†Gilvarry, J. J., *Temperatures in the earth's interior.* *Journal of Atmospheric and Terrestrial Physics*, London, 10(2):84-95, Feb. 1957. 4 figs., 2 tables, 30 refs., 21 eqs. **DWB**—By several lines of reasoning, temperature to a depth of 6000 km is estimated as $T(1000^\circ\text{K}) = 0.773 + 0.750d + 0.463d^2 - 0.1148d^3 + 0.00708d^4$ where d is depth in 1000 km. The accuracy of this is estimated as $\pm 25\%$. *Subject Heading: 1. Underground temperatures.—C.E.P.B.*

12.2-148

551.24:525.213:551.525.4

Jobert, G. and Le Mouél, J., *Tensions engendrées dans la Terre par des sources de chaleur inégalement réparties.* [Stresses developed in the Earth by unequally distributed heat sources.] *Académie des Sciences, Paris, Comptes Rendus*, 250(13):2400-2402, March 28, 1960. 2 refs. **DWB, DLC**—To explain the pre-continental orogenesis some authors call in the action of horizontal stresses existing between the masses with continental and oceanic structure. A part of these stresses might be issued from the horizontal thermal gradient due to the unequal distribution of the heat sources within the surface layers of the globe. The authors establish theoretical formulas for a very simple case where one supposes the structure cylindrical, the body elastically homogeneous and where one considers the regime state in which a flow of uniform heat comes from an infinite zone. The solution of this simple case applied to a heterogeneous medium permits to evaluate the stresses developed by the difference in temperatures at the same depth under the oceans and under the continents. The results show that the orders of magnitude of the differential stresses due to heterogeneity of the heat sources and thermal coefficients are sufficiently large to be taken into account. *Subject Headings: 1. Internal geodynamics 2. Continental orogenesis 3. Horizontal stresses 4. Earth temperature 5. Soil temperature gradient.—A.V.*

12.2-149

551.23:620.91/97

Mériel, Yves, *L'énergie géothermique*. [The geothermal energy.] *La Nature*, Paris, No. 3292:356-362, Aug. 1959. 13 figs. **DLC**—Principles of the methods and techniques used in order to pick up the so called geothermal energy, produced by geysers, fumaroles, hot springs, etc. . . . The author deals in details with the use of the geothermal energy in New Zealand and provides peculiarities on geology, tectonics, lie of the vapor field, etc. . . . of these special phenomena appearing in the crust of the earth. *Subject Headings*: 1. Geothermal energy 2. Utilization of geothermal energy 3. New Zealand.—A.V.

E8. APPLIED GEOPHYSICS

12.2-150

550.37:622

Ormea, G. B. (*Cagliari Univ., Faculty of Engineering*), *Consolidamento elettrico ed impermeabilizzazione dei terreni (con cenni di altre applicazioni geoelettriche)*. [Electric consolidation of soils and the establishment of soil impermeability, with notes on other geoelectric applications.] *Geofisica e Meteorologia*, Genoa, 3(1/2):17-19, Jan.-April 1955. **DWB**—Electric conductivity of soils can determine hydrological as well as geological nature of subsoil. *Subject Headings*: 1. Geo-electricity 2. Geophysical prospecting.—M.R.

12.2-151

551.579.5

Schuster, Klaus, *Geophysikalische Erkundung in Sudan*. [Geophysical prospecting in Sudan.] *Freiberger Forschungshefte, Ser. C, Geophysik*, Berlin, No. 70, 1959. 55 p. 24 figs. **DLC**—A publication on the work of a ground-water prospecting group in the mountainous part of the Sudan (Kordofan). The author gives a great deal of information about this country; all other geophysical research made in this field is mentioned and the seismic refraction procedures have been used with very good results. *Subject Headings*: 1. Ground water hydrology 2. Geophysical ground water logging 3. Sudan.—A.V.

12.2-152

551.5:550.3:061.3

15th meeting of the European Association of Exploration Geophysicists. *Geophysical Journal*, London, 2(1):80-83, March 1959. **DWB, DLC**—A report of the 15th meeting of the European Association of Exploration Geophysicists, held in London in Dec. 1958. Out of a total of 21 papers presented, three dealt with the IGY, two with general theory and observations, seven described instruments and instrumental techniques, and nine discussed case histories and interpretive methods. Papers concerning geophysical research in Antarctica, pendulum measurements along geodetic arcs, the use of base-hole data, anisotropy measurements, evaluation of gravity terrain corrections and irregular diurnal magnetic variations have been specifically mentioned. *Subject Headings*: 1. Geophysical conferences 2. London, Eng.—I.S.

F. OCEANOGRAPHY AND HYDROLOGY

1. OCEANOGRAPHY

See also: **Oceanog. texts** (Plakhotnik), 12.2-1; **Tides** (Groves), 12.2-113; **Sea water composition** (Chaigneau), 12.2-140; **Ocean-atmos. interaction** (Girs), 12.2-291; **Wind effects on water surfaces** (Francis), 12.2-360.

12.2-153

551.509.58:551.526.6(265.4)

Hishida, Kozo (*Kobe Marine Observatory*), *On the forecasting of water temperature in the Japan Sea*. *Oceanographical Magazine*, Tokyo, 9(1):51-54, Sept. 1957. table, 12 refs. **DWB, DLC**—The present paper confines the problem of forecasting of water temperature to that of the surface water temperature in the region within about 100 mi from the coast for which considerable data is available. For the purpose the state of Tusima current in the entrance of the Japan Sea is surveyed. The effect due to meteorological conditions and due to the presence of the proper cold water mass, on this sea are taken into consideration. The data examined are those collected by Fuknok Fisheries Institute. Through this examination

various criteria for forecasting are developed. By way of example, a comparison of forecasted values with measured ones in 1956 are tabulated. *Subject Headings: 1. Water temperature forecasting 2. Ocean temperature data 2. Sea of Japan.—I.S.*

12.2-154

551.556.8:551.465

†Ichiye, Takashi (*Florida State Univ.*), **On water budget in a two-layered ocean.** *Oceanographical Magazine*, Tokyo, 11(2):111-126, March 1960. 8 figs., 20 refs., 27 eqs. **DWB, DLC**—A two-layered ocean bounded with east and west coasts is envisaged. The regimes of flow in the upper and lower layers are divided into a narrow western boundary current and an inner geostrophic flow. The wind stresses act upon the inner flow in the upper layer. The water budget in a part of the ocean bounded with two coasts and two latitude circles is determined by meridional transports of the western inner flows across two latitudes and the vertical transports through the interface. The equation of conservation of mass leads to the differential equation about the integrated vertical current along a latitude. The latter equation can be solved when the western transports and wind stresses are known. The result is applied to the data of the Atlantic and the North Pacific to determine the transports of the inner flow in both layers, the vertical transport and the western transport in a lower layer from the wind stresses and western transport in a upper layer. In the Atlantic Ocean the meridional transport of the inner flow is southward in the upper layer and northward in the lower layer in most latitudes. The vertical motion is upward in the North Atlantic and downward in the South Atlantic. In the North Pacific the inner transport is southward in both layers and is much smaller in magnitude than in the Atlantic. The vertical motion in the middle latitudes of the North Pacific is downward, in contrast to the North Atlantic. *Subject Headings: 1. Wind effects on water surfaces 2. Oceanic circulation.—Author's abstract.*

12.2-155

551.465(728.7-52)

Schaefer, Milner B. and Bishop, Yvonne M. M. (*both, Scripps Inst. Oceanog., La Jolla, Calif.*), **Particulate iron in offshore waters of the Panama Bight and in the Gulf of Panama.** *Limnology and Oceanography*, 3(2):137-149, April 1958. 9 figs., 5 tables, 9 refs. **DLC.** Reported as *California. Univ. Scripps Institution of Oceanography, Contributions*, 1958, issued 1959. p. 541-553. **DWB** (551.46 C153co 1958)—Particulate iron is reported from replicate samples taken at two depths at several locations in the Panama Bight during Nov. 1955, and in replicate samples taken at two depths at a single inshore location in the Gulf of Panama at bimonthly intervals from Dec. 1954 through Dec. 1955. In addition, a few samples were taken at other locations in the Gulf of Panama and from a river flowing into the Gulf. The content of particulate iron, both in the Panama Bight and in the Gulf, shows highly contagious distributions, necessitating a logarithmic transformation to make the data amenable to statistical analysis. All samples from the Panama Bight could have arisen from a single log-normal distribution with a mean of $12.2\mu\text{g/L}$. In the Gulf of Panama, there is significantly higher iron in the surface ($115.2\mu\text{g/L}$) than at 30 meters ($62.1\mu\text{g/L}$) during the early part of the year when the standing crops of plankton organisms are high. Particulate iron content is higher inshore in the Gulf of Panama than offshore in the Panama Bight, and two samples from the Rio Escota, containing 692 and $863\mu\text{g/L}$, were much higher than in the Gulf, indicating that possibly the iron is being brought in by runoff. From comparison of iron content in inshore and offshore waters, in both of which biological production is high, it is inferred that particulate iron cannot be a limiting factor on phytoplankton growth in the inshore waters. *Subject Headings: 1. Iron content of offshore water 2. Panama Bight 3. Gulf of Panama.—Authors' abstract.*

12.2-156

525.63:551.461.2:517.512

*†Haubrich, Richard, Jr. (*Univ. of Wisconsin*) and Munk, Walter (*Scripps Inst. of Oceanog., Univ. Calif.*), **The pole tide.** *Journal of Geophysical Research*, Wash., D. C., 64(12):2373-2388, Dec. 1959. 4 figs., 5 tables, 24 refs., 37 eqs. **DLC**—About 10,000 mean monthly values of sea level from 11 tide stations have been analyzed by the method of TUKEY to obtain the power spectra in the frequency range of 0.0125 to 6 cycles per year (cpy). The spectral density is on the order of $10^3 \text{ mm}^2/\text{cpy}$ and is remarkably uniform over this frequency range, with the following exceptions: (i) a sharp rise at the low-frequency tail, from $10^3 \text{ mm}^2/\text{cpy}$ at 0.1 cpy

to 10^6 mm²/cpy at 0.0125 cpy (presumably associated with variations in recorded sea level arising from continental unrest); (ii) the line spectrum associated with the annual variation and its harmonics; and (iii) a weak peak of 0.84 cpy, barely above noise level, which is identified with the 14-month 'pole tide' corresponding to the earth's free nutation (Chandler wobble). The average pole tide for all stations gives an amplitude twice that predicted by equilibrium theory. The contribution to the peak of the pole tide is largely from three localities: Swinemünde, Marseille, and a combined set of Netherlands stations. Apparently the pole tide is not in accord with equilibrium theory. This raises some questions concerning the interpretation of Love numbers as derived from the period of free nutation. *Subject Headings:* 1. Pole tide 2. Power spectrum analysis.—*Authors' abstract.*

12.2-157

551.465

Fukuoka, Jiro (*Meteorological Research Institute, Tokyo*), **The variations of the Kuroshio current in the sea south and east of Honshu (Japanese Main Island)**, *Oceanographical Magazine*, Tokyo, 10(2):201-213, Dec. 1958. 8 figs., 4 refs., eqs. DWB, DLC—The present paper discusses the appearance of the cold water mass east of Miyake-jima and the meandering of the Kuroshio east of Honshu (Japanese Main Island). The author studied the relation between the existence of the cold water mass and the meandering of the Kuroshio east of Honshu, and explained that the meandering was due to planetary waves. *Subject Headings:* 1. Kuroshio current 2. Current meandering 3. Honshu, Japan.—*Author's abstract.*

12.2-158

551.465

Knauss, John A. (*Scripps Inst. of Oceanog., La Jolla, Calif.*) and King, Joseph E. (*Pacific Oceanic Fisheries Investigation, Honolulu, Hawaii*), **Observations of the Pacific Equatorial undercurrent**, *Nature*, London, 182(4635):601-602, Aug. 30, 1958. 5 refs. DWB—The undercurrent which was discovered by TOWNSEND CROMWELL in 1952 has now been successfully measured as a result of the Dolphin Expedition of March 27-June 10, 1958, which was incorporated in the IGY program. The 3500 mi east flowing current centered at the Equator transports about 30 million cu m/sec with the highest velocity ($2-3\frac{1}{2}$ knots) measured at a depth of 100 ± 13 m at the Equator. Top and bottom is at about 30 and 300 m for 0° and 140° W respectively. It is suggested that the current be named Cromwell Current in honor of its discoverer who died in an air crash (June 2, 1958) only 3 days after the completion of the measurements, while on his way to new scientific tasks at Acapulco. *Subject Headings:* 1. Equatorial ocean currents 2. Dolphin Expedition, 1958 3. Pacific Ocean.—*W.N.*

12.2-159

551.465:551.464(262.5)

Berenbeim, D. Ia., **Rechnaia i Azovskaia voda v Chernom more**. [River and Azov-sea waters in the Black sea.] *Priroda*, Moscow, 7:89-91, July 1959. 5 figs., 2 refs. DLC—Due to the immense discharge of river water (Danube, Dnieper, Dniester, South Bug) into the Sea, amounting to about 340 cu km without considering the salty Azov Sea water, the salinity of the Black Sea water is almost two times below the average salinity of the world ocean. In this paper the author discusses the distribution of the river water on the surface and in the deeper layers of the Black Sea without mixing with the sea water, its gradual mixing and effect upon the salinity of the Black Sea. The advancement of the Azov Sea water through the Kerch Strait is also discussed. *Subject Headings:* 1. Sea water salinity data 2. Salinity observations 3. Black Sea.—*A.M.P.*

12.2-160

551.464:546.211

Okubo, Akira (*Japan Met. Agency*), **Estimation of biological effects in the distribution of dissolved oxygen by use of isopycnic analysis (The distribution of dissolved oxygen in the sea east of Honshu, Japan, Pt. 1)**, *Oceanographical Magazine*, Tokyo, 9(1):75-86, Sept. 1957. 9 figs., 12 refs., 9 eqs. DWB, DLC—On the assumption that sea waters in the area of transition, east of Honshu, Japan, are maintained by lateral mixing of two original water masses (Kuroshio and Oyashio) primarily along the surfaces of constant σ_t , dissolved oxygen anomalies of mixed waters caused by chemical and biological effects are estimated with success by means of a T-Cl-(O₂)c diagram, except in warm regions of Kuroshio type. *Subject Headings:* 1. Oxygen in sea water 2. Marine biology.—*Author's abstract.*

12.2-161

551.463:535.5:535.312

Ivanoff, Alexandre (*Ecole Supérieure de Physique et de Chimie, Paris*), Optical method of investigation of the oceans: the p - β diagram. *Optical Society of America, Journal*, 49(1):103-104, Jan. 1959. 2 figs., 5 refs., eqs. DWB, DLC—A note introducing the factor p (degree of polarization) and suggesting the use of the p - β diagram to improve the optical methods of investigation of the oceans. A diagram of the apparatus, used to measure the degree of polarization and its scattering coefficient β is graphically represented. A specific example of the p - β diagram, obtained May 6, 1958 in the Mediterranean Sea, 43°34'N and 7°28'E, is discussed and graphically presented, and the conclusions deduced therefrom concerning the application of p - β diagram are stated. *Subject Headings*: 1. Polarization effects on water surface reflection 2. Oceanographic optics.—I.S.

F2. HYDROLOGY

12.2-162

551.579:061.3

Lizărescu, Dumitru, Aspecte hidrologice de la ciclul de studii interregional din R. P. F. Iugoslavă (28 Oct.-23 Nov. 1957). [Hydrological aspects of the interregional study tour held in Yugoslavia Oct. 28-Nov. 23, 1957.] *Meteorologia, Hidrologia și Gospodăria Apelor*, Bucharest, 3(1):69-74, 1958. 7 figs., eqs. DWB—The World Meteorological Organization, with the help of the government of Yugoslavia, arranged a seminar on hydrology from October 28 to November 23, 1957 in Yugoslavia. Two Russian (G. A. ALEKSEEV and G. P. KALININ) and three American (C. W. THORNTHWAITE, J. R. MATHER and R. K. LINSLEY), authorities lectured and conducted practical exercises in problems of water balance, runoff calculation, and hydrologic forecasting. Summaries of the lectures are given, and the present state of hydrological observation and research in Yugoslavia is described. *Subject Headings*: 1. Hydrologic conferences 2. Hydrologic research 3. Yugoslavia.—G.T.

12.2-163

551.579(439.1)

†Németh, E., Hydrological research in Hungary compiled from reports of the Hungarian Research Institutes for the 1957 Toronto Congress of the I.U.G.G. *Acta Technica (Academiae Scientiarum Hungaricae)*, Budapest, 18(1/2):167-206, 1957. 6 figs., 123 refs. DWB—A survey is made of hydrological information found in Hungarian historical records and of the development of modern hydrology in Hungary. In dealing with the last ten years accomplishments (up to 1956), the author describes the institutes and organizations engaged in hydrological work, instruments and research facilities available, research projects in progress and papers published in various branches of hydrology such as surface and ground water supply, hydrometeorology, hydrochemistry, erosion, forest influences, instrument development, etc. Illustrations of equipment and methods include a long-exposure photograph of floating flares marking stream lines in the Danube River. *Subject Headings*: 1. Hydrologic research 2. Hydrologic institutes 3. Hydrologic instruments 4. Hungary.—G.T.

12.2-164

551.582.3:551.579(234.8)

Kemmerikh, A. O., Karta srednego stoka rek Severnogo, Pripoliarnogo i Poliarnogo Urala. [Chart of the mean runoff of the rivers of the northern, sub-Polar and Polar Urals.] *Meteorologiya i Gidrologiya*, Leningrad, No. 4:47-50, April 1959. fig., 2 refs. DWB, DLC—The author presents the runoff characteristics, the territorial distribution of runoff and the procedure for determining its amount in the absence of direct hydrometric observations for the rivers of the northern, sub-Polar and Polar Urals. A map of the mean annual runoff of the rivers of northern, sub-Polar and Polar Urals (runoff in lit/sec km²) is presented and its construction is described. The isolines of runoff on the map just as the isolines of precipitation, evaporation and of mean daily atmospheric temperature on approach from the west to the Urals alter their latitudinal direction along the meridional direction following the change of height of the locality. The region of maximum runoff coincides with the region of the maximum humidification of the territory by precipitation and is situated in the most elevated parts of the western slope of the Urals—in the basin of the Shugor, Kosa, Ilych, Pogcheren and Vishera Rivers. Their modules reach 20-30 l/sec km² and in the upper reaches exceed 30 l/sec km². The rivers of the greater and minor Usa, the basin of the left bank tributaries of Usa, etc. are characterized by a considerable specific water load. Their mean module is

between 10 and 25 l/sec km². The minimum runoff is observed in the southeastern lowlands of the northern Urals—in the lower reaches of the Sor'va River where the mean module is 3.75 l/sec km². The mean annual runoff within the limits of the mountain and lowland regions of the northern, sub-Polar and Polar Urals amounts to 110.7 km³ which corresponds to a mean module runoff of the territory of 12.3 l/sec km². *Subject Headings:* 1. Runoff calculations 2. Runoff maps 3. River runoff 4. Urals.—I.L.D.

12.2-165

551.579.1:551.588.6(477)

Onufrienko, L. G., *Vliianie lesa na srednegodovoi stok malykh rek.* [Forest influence on mean annual runoff of small river.] Kiev, Ukraine. *Nauchno-Issledovatel'skii Gidrometeorologicheskii Institut, Trudy*, 4:72-76, 1955. fig., table, 3 refs.—The mean annual runoff for 12 pairs of catchment areas ranging from 0.1 to 6000 km² with different degrees of forest density were investigated in order to determine what is the effect of forests on the mean annual runoff of small rivers. Data on catchment area, percent forest cover, underground runoff, surface runoff, etc. are given in a table. An analysis of the data shows that the mean runoff in more forested basins is, as a rule, larger than in less forested areas, also the underground runoff in the more forested areas is usually greater than that in the less forested areas. This is explained by the fact that in the Ukraine the forest helps to increase the snow reserves toward the spring up to the time of rapid thaw so that there is less infiltration in the soil and greater surface runoff. There is also a reduced evaporation from forest soils which over compensates increased transpiration. A graph showing the dependence of mean annual runoff upon degree of forest cover is presented. *Subject Headings:* 1. Forest influences on runoff 2. River runoff 3. Ukrainian S.S.R.—I.L.D.

12.2-166

551.577.32:551.579.4

Srebnenovic, Dioniz, *Relation between rainfall and run-off of a month as unit of time.* *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Toronto, Sept. 1957, [Transactions]*, 3:203-218, pub. 1958. 7 figs., tables, 5 refs. English summary p. 217-218. DWB (M(06) 1611g)—The runoff of an area is not only a function of climatic factors and soil elements, but also of space and time. Other related factors are: temperature, relative humidity, wind and cloudiness. These are discussed in this report. In order to solve the problem of the relation between the rainfall and runoff during the period of a month, the author has set up and solved the equation: $Q = a \log (H_1 \div 10) (H \div 10)^b$ where Q is the maximum possible span; H the monthly rainfall, and H_1 the quantity of rainfall from previous month, and a, b are the numerical values for each month and are found according to the Gaussian method of least squares. *Subject Headings:* 1. Rainfall-runoff relationships 2. Rainfall variations.—N.N.

12.2-167

551.509.58:551.579:633

Dwyer, Carroll H. (*Soil Conservation Service, Portland, Oreg.*), *The economics of water supply forecasting.* *Western Snow Conference, April 1958, Proceedings*, 26:63-66, Oct. 1958. DWB (M(06) W527p)—The author has defined the economic worth of water supply forecasts, and has shown how this evaluation affects the probable crop composition, the monthly and seasonal demands and supplies of water in the judicious raising of crops as well as on soil conservation. Economic data on the monetary values in the agricultural uses of water and on crops requiring irrigation are discussed; based on the studies conducted during 1955 and 1956 in the Salmon Falls Creek area of Southern Idaho. *Subject Headings:* 1. Water supply forecasts 2. Crops 3. Irrigation 4. Idaho.—N.N.

12.2-168

551.579:551.482.2(234.42)

Rybkina, A. Ia., *Osobennosti pitaniia rek vostochnoi chasti Karpat.* [Characteristic river alimentation in the eastern Carpathians.] *Meteorologiya i Gidrologiya*, Leningrad, No. 7:30-33, July 1959. 4 tables. DWB, DLC—Important qualitative characteristics of river conditions on both slopes of the Carpathian Mountains are reviewed in view of limited information in the literature. The flow of water in 30 rivers during a 10-15 year period was observed with special attention to various sources of alimentation, including ground water, rain and snow. The territories are covered from basin of Dniester, Prut, Tisza and small rivers

on the Carpathian slopes. Detailed characteristics of river basins, area, height and partial distribution of the sources (ground water, snow and rain) are tabulated. *Subject Headings:* 1. River alimentation 2. Carpathian Mountains.—*N.P.S.*

12.2-169

551.579:551.457

Ivanov, K. E., O nekotorykh nesootvetstviakh raschetnykh skhem osusheniia bolot prirodnym osobennostiam ikh vodnogo rezhima. [Certain discrepancies between calculation schemes for the drying of swamps and the natural characteristics of their water regime.] *Vsesoiuznyi Gidrologicheskii S"ezd, Trudy* (of 3rd Conference, Oct. 1957), Vol. 7, issued 1959. p. 164-169. DWB (M79 V985tr)—The author criticizes methods of drainage design in peat deposits based on depression curves of either uniform or non-stationary flow. Experiments show that such curves are valid only at very short distances from drainage ditches. Therefore depth of ditches and horizontal flow are not as important factors of design as evaporation and vertical capillary flow. Air photography is a great help in discovering interior water deposits in peat. Design of drainage as well as water conservation can be based on such air pictures. *Subject Headings:* 1. Drainage 2. Swamp hydrology.—*J.N.*

12.2-170

551.579:551.324.86(234.3)

*†Lanser, Otto (*Bundesministerium f. Land- und Forstwirtschaft*), Beiträge zur Hydrologie der Gletschergewässer. [Contribution to the hydrology of glacial streams.] *Österreichischer Wasserwirtschaftsverband, Schriftenreihe*, No. 38, 1959. 63 p. 7 figs., 11 tables, 26 refs. DWB (M79 O85sc)—The water economy of glaciers in the Austrian alpine region is discussed based on recordings from the following gage stations: Alpe Albiqua, Vent, Zorgmeier, Gattür, Ausservillgraten at 2043, 1885, 1725, 1580 and 1248 m.a.s., respectively. The tabulated data of monthly means of runoff, precipitation and ablation covers periods ranging from 1951-1954, 1932-1942, 1944-1954, and 1891-1953, 1901-1950, 1907-1953, 1912-1953. In order to obtain an estimation of the glacial water yield the data are held against those from a non-glacial alpine region. *Subject Headings:* 1. Glacier water balance 2. Hydrology of glacier 3. Austrian Alps.—*W.N.*

12.2-171

551.579(497.2)

Ivanov, I. M., Izuchennost' vod Narodnoi Respubliki Bolgarii. [State of knowledge on the waters of the People's Republic of Bulgaria.] *Vsesoiuznyi Gidrologicheskii S"ezd, Trudy* (of 3rd Conference, Oct. 1957), Vol. 7, issued 1959. p. 119-129. 4 figs. DWB (M79 V985tr)—Short historical development of hydrographic services of Bulgaria is presented. Today there are 292 discharge gaging stations (1 per 375 sq km), 55 chemical analysis stations and 103 sediment transport gaging stations. To date, a chart of isolines of average annual unit discharge (runoff) has been drafted (ranging from 0.5-35 liters per second per sq km), the distribution of runoff in the year has been computed, both for the years 1936-55 and a chart of sediment transport isolines has been drafted on basis of extrapolation of a five year period. Finally, the chemical content (aggressivity) of surface water has been analyzed and chart drafted for some period. The work is done by the united Hydrometeorological Service and Hydrological and Meteorological Research Institute. *Subject Headings:* 1. Hydrologic services 2. Hydrography 3. Bulgaria.—*J.N.*

12.2-172

551.501.9:551.579:551.312.2(472)

Savenko, I. V., O gidrometeorologicheskikh stantsiiakh na torfianykh massivakh. [Hydrometeorological stations on peat massifs.] *Meteorologiya i Gidrologiya*, Leningrad, No. 11: 47-48, 1958. DWB, DLC—The program for establishing hydrometeorological stations in the peat massifs is discussed. The first hydrometeorological station was opened in 1954 on the Lariansk peat bed in Leningrad Region. The purpose of the station is (1) to obtain reliable data for computing runoff normals and to develop methods of computing runoff from drained and exploited peat fields; (2) to ascertain the hydrological and meteorological conditions produced by the repeated moistening of the upper parts of the peat massifs; and (3) to develop a more effective extraction of the water retaining slightly disintegrating peat deposits. As a result of the work carried out the following were established: (1) runoff modules for different landscapes and for utilization of peat fields; (2) presence of a higher content of dry matter

in the peat mass during the period of "maturation," (3) degree of filtration from the lake in the central part of the massif; (4) considerable variation in the chemical composition of water in lakes subject to intensive water exchange. The further research program is outlined and the areas where hydrometeorological stations are to be set up are listed. *Subject Headings:* 1. Hydrometeorological stations 2. Peat massifs 3. Runoff.—*I.L.D.*

12.2-173

551.579:551.588.6(494.245)

*Casparis, Ernst (*Schweizerische Anstalt für das forstliche Versuchswesen*), **30 Jahre Wassermessstationen in Emmental**. [Thirty years of observation at the water measuring stations in the Emme Valley.] *Switzerland. Anstalt für das Forstliche Versuchswesen, Mitteilungen*, 35(1):179-224, 1959. 8 figs., 15 tables, 6 refs. French, Italian and English summaries. **DLC**—This work is a summary of the results of the last 30 years of hydrometric observations in the Emme Valley. This study made it possible to determine and to express by numerical data, the effect of afforestation on the water regime of torrents. It also explains as far as possible, the causes of the different behavior in forested and nonforested watershed areas. The author establishes the fact that in the forest less precipitation reaches the soil than in the open areas. Evaporation is less from under the protection of forests than the open. The transpiration of the woody growth must accordingly exceed the water consumption of the less deeply rooted grass vegetation. A comparison of the summer and fall tabulated values offers a clue to this fact. This study illustrates the regulating influence of forest upon peak flows. The amount or peak maximum runoff is controlled by the intensity of the rainfall. A quantity of total runoff for a given rainfall depends exclusively upon the degree of soil moisture at the beginning of the rainfall. The regulating influence of the forest upon runoff in the sense of increasing the low water flows is of as great a significance in the water economy of a country as the mitigation of flood danger. If a dense forest, because of lesser surface runoff leads to less soil displacement than a steep pasture slope, it can, on the other hand, only reduce erosion in so far as it is possible to decrease floods. *Subject Headings:* 1. Forest hydrology 2. Forest influences 3. Forest soil moisture 4. Emme Valley, Switzerland.—*A.V.*

12.2-174

551.48.018

Nash, J. E. (*Hydraulics Res. Station*), **Systematic determination of unit hydrograph parameters**. *Journal of Geophysical Research*, Wash., D. C., 64(1):111-115, Jan. 1959. 4 figs., 9 refs., 8 eqs. **DLC**—In unit hydrograph correlations the number of degrees of freedom which it is useful to maintain in the form of the instantaneous unit hydrograph is shown to be limited by the number of significant independent correlations with the catchment characteristics. The moments of the instantaneous unit hydrograph are suggested as a series of parameters of the response, for which correlations should be sought. A simple method of obtaining these moments is evolved, and a method of choosing, in any given case, between several two-parameter forms is demonstrated. *Subject Heading:* 1. Unit hydrographs.—*Author's abstract.*

F3. LAKE HYDROLOGY

See also: Wind effects on lake levels (Dussart et al.), 12.2-359; Wind field in shallow lakes (Khvan), 12.2-361.

12.2-175

551.579:551.481(28.45)

†Picotti, Mario (*Sperimentale Talassografico, Trieste*), **Ricerche nel Lago d'Orta**. [Investigations on Lake Orta.] *Trieste. Istituto Sperimentale Talassografico, Pubblicazioni*, No. 352, 1958. 36 p. 7 figs. (3 fold.), 8 tables, 53 refs. Italian, French, English and German summaries p. 22-23. (Reprinted from *Bollettino di Pesca, Piscicoltura e Idrobiologia*, n.s., 12(2):126-158, July/Dec. 1957.) **DWB, DLC**—Because of industrial pollution, the physical, chemical and biological characteristics of the lake of Orta waters have been greatly modified, especially with regard to a remarkable increase in the concentration of copper's ions. With the aim of determining said conditions, in the years 1953-1955, three short cycles of researches have been made, with stations distributed along the axis from Buccione (south) to Omegna (north) from the surface to the maximum depth of the lake (145 m). From the physical and chemical conditions observed in the waters, the thermal regime, the oxygenation, the dissolved

copper content (from 40 to $213\gamma-1^{-1}$), the hydrogen ion-concentration, the mineralization, the fixed residuum, the hardness of waters, are deduced. These observations have been collected in the above mentioned period of three years, in 35 stations, at 146 different levels. *Subject Headings: 1. Lake hydrology 2. Lake Orta, Italy. —Author's abstract.*

12.2-176

551.556.8:551.481

Farrer, Lawrence A. (*Corps of Eng., Jacksonville, Fla.*), **Wind tides on Lake Okeechobee. Conference on Coastal Engineering, 6th, Univ. of Florida, Dec. 1957, Proceedings, pub. 1958. p. 134-146. 7 figs., 10 refs. DWB (627 C748pr)**—Huge projects near large bodies of water may be hampered by wind tides and wave action. In 1948 the Corps of Engineers initiated investigations near Lake Okeechobee in order to study and collect data on wind velocities, wind tides and waves. A summary of the results of their work is presented here. The curves are empirical but the study, if intensified, will lead to a development of accurate procedures for determining wind tides on all bodies of water. *Subject Headings: 1. Wind effects on tides 2. Lake Okeechobee, Fla.—N.N.*

12.2-177

551.579:551.481.1:532.594(28,540)

†Janardhan, S. (*Met. Office, Poona*), **Some computations on seiches in Lake Fife at Khadakvasla, Poona. Indian Journal of Meteorology and Geophysics, Delhi, 10(3):266-274, July 1959. 4 figs., 16 refs., 21 eqs. DWB, DLC—CRYSTAL** has worked out a number of formulas for seiche-periods under various assumptions regarding the shape of the bed of the lakes where these seiches are excited. Based upon his method, periods of seiches that could be excited in Lake Fife at Khadakvasla have been computed. The periods of the uninodal, binodal, trinodal and quadrinodal seiches are obtained approximately as $1\frac{1}{4}$ hours, $\frac{2}{3}$ of an hour, $\frac{1}{2}$ of an hour and $\frac{1}{3}$ of an hour respectively. Hidaka's method of solving Chrystal's differential equation by the use of the theorem of Ritz in the calculus of variation, has been used for the case, where the lake's bottom is assumed parabolic. The uninodal period thereby worked out for Lake Fife comes out to be $1\frac{1}{4}$ hours. For a test of these computed values, experimental observations are required and it is suggested that a suitable limnograph be set up for the purpose of recording these oscillations when natural phenomena excite them. *Subject Headings: 1. Seiches 2. Lake hydrology 3. Lake Fife, Poona, India.—Author's abstract.*

12.2-178

551.509.313:551.515.2:551.465(285:773)

Platzman, George W. (*Univ. of Chicago*), **A numerical computation of the surge of June 26, 1954 on Lake Michigan. Geophysica, Helsinki, 6(3/4):407-438, 1958. 14 figs., table, 12 refs., 6 eqs. DWB, DLC.** Also issued as: Chicago. Univ. Dept. of Meteorology, Contract Cwb 9270, Technical Report No. 1, June 1958. 32 p.+11 figs., table, 12 refs., 6 eqs. DWB (M15.2 C532tec). Also issued as: *Conference on Great Lakes Research, 3rd. Ann Arbor, Mich., May 6-7, 1959, Proceedings, pub. 1960. p. 21-25. fig., table, 4 eqs. DWB (M82/779 C748pr)*—An intense and fast-moving squall line passed over the southern part of Lake Michigan on the morning of 26 June 1954. The resulting disturbance of the lake produced a surge which in some places on the Chicago lake front attained an amplitude of six feet or more. In this study a numerical investigation was made, in order to explore the problem of predicting the motions of the lake on the basis of simple dynamical theory. By means of a high-speed computer, the primitive dynamical equations were integrated numerically for the "tidal" motions produced by a hypothetical squall-line. The model is two-dimensional and takes into account the proper bottom and shoreline configurations. *Subject Headings: 1. Numerical lake current forecasting 2. Squall lines 3. Lake Michigan, Illinois.—Author's abstract.*

F4. GLACIOLOGY

See also: Glaciological data, Antarctica, 12.2-14; Hydrology of glaciers (Lanser), 12.2-170.

12.2-179

551.32:016(72)

†Lorenzo, Jose L. (*Inst. de Geofísica, Univ. de Mexico*), **Glaciología Mexicana. [Mexican glaciology.] Boletín Bibliográfico de Geofísica y Oceanografía Americanas, Mexico City, Vol. 1, Parte Geofísica, issued 1958. p. 131-136. 54 refs. DPU—Discussion of glaciers on active**

or other volcanoes in Mexico, their discovery and study during the past century or so, and of recent publications on glacial geology of this area. *Subject Headings: 1. Glaciology of Mexico 2. Glaciology bibliographies 3. Mexico.—M.R.*

12.2-180

551.506.1:551.324.5:551.578.46(494)

Renaud, A., *Les variations des glaciers suisses 1958*. [Swiss glacier variations in 1958.] *Les Alpes*, Bern, 35(3):227-237, 1959. 7 illus., 4 tables, 7 refs. **NN**—Because of the IGY program, the study of glaciers was intensified in Switzerland and observations were extended to the greatest possible number of glaciers. The author gives an account of the weather which prevailed on the Swiss Alps and of the evolution of the Alpine snow cover. Taken as a whole, the snow cover left at the end of the nivological year 1957/58 was smaller than on the average. The general retreat of Swiss glaciers was very active and manifested itself by the retirement of the fronts as well as by a lessening of their mass. The mean variation in length is -16.2 m by glacier (retreat), value which is higher than those of the three previous years. The progressive and constant diminution of certain glaciers resulted in the formation of temporary lakes in many places. Tables indicate for the Swiss glaciers their variations in length (1957/58) and in surface by hydrographic basin for the years 1876 to 1934. During this period of time the Swiss glaciers lost a total surface of about 275 sq km. *Subject Headings: 1. Glacier-meteorological observations 2. Glacier variations 3. Snow cover observation 4. Switzerland.—A.V.*

12.2-181

551.583:551.324.433(67)

Whittow, John B. and Shepherd, A., *The Speke glacier, Ruwenzori*. *The Uganda Journal*, Kampala, 23(2):153-161, Sept. 1959. 3 figs., table, footnotes.—The present characteristics of the Speke glacier, which is the largest individual glacier of the Ruwenzori, are described. The evidence for recent changes and the possible climatological reasons for the present shrinkage are investigated. The Speke glacier is approximately 450,000 sq yds in total area. The accumulation zone is 300,000 sq yds and the ablation zone 150,000 sq yds. The glacier descends almost due southwards and its present termination is at a height of $\pm 14,250$ ft, which is about 450 ft below the average elevation of the permanent snow line on the Uganda slopes of the Ruwenzori. The Speke glacier is at present in the midst of a recessional phase, it decreases in length, width and thickness. If the present rate of ablation remains unchanged it is likely that the Speke glacier will be reduced to nothing more than a summit ice-cap within a period of about 40-50 yrs. Comparative results of measurements in June 1958 and Jan. 1959 are shown in table. At a point just above the ice front the glacier measured approximately 320 yds across in 1950, whilst in 1958 the width was only 265 yds. The thickness of the ice front in 1950 was recorded as being 120 ft in places, whereas in June 1958 it was nowhere more than 60 ft thick. The main reasons for the present shrinkage of the Speke glacier might be a decrease in the amount of precipitation, a rise in the average temperature of the region and an excessive surface ablation caused by increased direct insolation. *Subject Headings: 1. Glacier variations 2. Glacial ablation 3. Climatic variations 4. Ruwenzori, Central Africa.—A.V.*

F5. ICE

See also: Heat balance of pack ice, Arctic (Untersteiner), 12.2-8; Geophysical investigations, Ice Island T-3 (Keller), 12.2-9.

12.2-182

551.322:548.3

Rohrhofer, Joseph, *Eisfleckung durch Gasblasen*. [Spots in ice caused by gas bubbles.] *Wetter und Leben*, Vienna, 7(5/6):123-124, 1955. 2 photos. **DLC, DWB**—The gas bubbles enclosed in the ice are attributed to algae growing upon underlying stones. These air bubbles were found to be richer in oxygen than the atmosphere. The description of these bubbles is accompanied by photographs. *Subject Heading: 1. Oxygenated ice.—I.L.D.*

12.2-183

548.0:539.1

Kahane, André, *Vibrations de basse fréquence du réseau cristallin de la glace*. [Low frequency vibrations of the crystalline structure of ice.] *Académie des Sciences, Paris, Comptes*

Rendus, 250(3):500-502, Jan. 18, 1960. 2 figs., table, 7 refs. DWB, DLC—A simple mechanical diagram of the crystalline structure of ice facilitates the interpretation of certain experimental results relating to the Raman spectrum of an ice monocrystal. *Subject Headings*: 1. Crystallography 2. Raman spectrum.—A.V.

12.2-184

536.421:546.212

Bibikov, D. N., *K voprosu o chisle kristallov l'da, nakhodiashchikhsia v pereokhlazhden-noi vode*. [Number of ice crystals in supercooled water.] *Akademiia Nauk SSSR, Doklady*, 109(6):1123-1125, 1956. 3 figs., table, 2 refs., 8 eqs. DLC (AS262.S3663). Eng. transl. available Associated Technical Services, P. O. Box 271, E. Orange, N. J., as its ATS-66K20R—A formula is developed whereby the number of ice crystals in supercooled water can be calculated if the change of water temperature due to crystallization, and the rate of ice particle growth are known. An experiment is reported (apparatus described and illustrated) in which these parameters were measured. The number of ice crystals per unit volume of water was found to be constant regardless of initial water temperature. *Subject Headings*: 1. Ice crystal content of supercooled water 2. Supercooled water.—G.T.

12.2-185

548.5:546.212

Fullman, Robert L., *The growth of crystals*. *Scientific American*, N. Y., 192(3):74-80, March 1955. photos., figs. DLC—The manner in which atoms or molecules in a vapor or solution form the regular architecture of a solid is explained by the assumption that they fall into place rather like the bricks laid in a special ramp. *Subject Heading*: 1. Ice crystal growth.—A.M.P.

12.2-186

548.1:546.212

Lisgarten, N. D. and Blackman, M., *The cubic form of ice*. *Nature*, London, 178(4523): 39-40, July 7, 1956. fig., table, 2 refs. DWB—The crystal form was studied by electron diffraction on deposits of ice from water vapor on bases at low temperatures. At -180 to -140°C the pattern was diffuse, from -140 to -120°C diamond-type cubic. The deposit evaporated completely at -105°C ; at -100°C hexagonal ice was formed. Different results by H. KÖNIG are attributed to contamination. Heavy water gave only slightly different figures. *Subject Heading*: 1. Ice crystal classification.—C.E.P.B.

12.2-187

536.421:546.212

Satō, Mizuho, *Der Mittelwert der durch die Gefrierung des in einem Gefässe fest geschlossenen Wassers verursachten Drucke*. [Mean value of pressure caused by the freezing of water in a tightly closed receptacle.] *Tokyo. Scientific Research Institute, Journal*, 48(1,349):65-70, June 1954. 3 refs., fig., 5 eqs. DWB—In an earlier paper, the author showed the necessity of lowering the freezing point of water enclosed in a cylindric or globular container in order to prevent the bursting by increased pressure due to the process of transformation from the state of water to ice. In this paper a method of calculating the mean value of this inner pressure, which is the compressing force caused by the countereffect of the container's walls, is developed. It is shown that at 26°C the mean pressure in a cylindric container decreases to 3,510 atm instead of 7,602 atm; and is of 4,210 atm at 30.8°C in a spheric container. *Subject Heading*: 1. Freezing of water 2. Pressure effects.—A.M.P.

12.2-188

548.5:546.212

Lilibouty, Louis, *Comparaison des rôles joués par les tensions internes et par le gradient thermique dans la recristallisation de la glace*. [Comparison of the parts of internal stresses and of thermal gradient in the recrystallization of ice.] *Académie des Sciences, Paris, Comptes Rendus*, 240(13):1449-1451, March 28, 1955. 9 refs. DWB—It is shown that crystals having their axes of highest thermal conductivity oriented in the direction of the thermal gradient will grow at the expense of adjoining crystals. It is believed that this effect often surpasses the growth resulting from internal stresses, especially in *nieve penitente* and dead ice. *Subject Heading*: 1. Ice crystal growth.—Transl. of author's abstract.

12.2-189

621.311.21

Simmonds, Arthur T. (*Conn. River Power Co.*), **Prevention of ice formation by air bubbling.** *Eastern Snow Conference, Proceedings, v. 2, 1953-1954*, p. 37-39. DWB—Experience with air bubble systems preventing the formation of ice, adjacent to gates, flash-boards and forebay booms at hydroelectric stations is described. One method is more economical than dropping by hand or application of steam. Trouble is experienced with formation of ice within the pipes and subsequent loosening in warm weather. *Subject Headings: 1. Ice prevention 2. Air bubbling in water 3. Hydroelectric power stations.—A.A.*

12.2-190

551.574.1:551.578.41

Fujino, Kazuo and Suzuki, Yosio, **Observations on the process of the ice rind formation on the surface of still water, Pt. 1.** *Low Temperature Science, Ser. A, Physical Sciences, Sapporo, Japan*, No. 18:149-155, 1959. fig., 8 plates, 11 refs. In Japanese; English summary p. 153-154. DWB, DLC—A series of freezing experiments was carried out in order to study the process of the ice rind formation. In each experiment, about 500 cc of water (sea water of chlorinity 18.01 0/00, city water and distilled water) contained in a 15×15×6 cm³ tray with a glass panel bottom was frozen in a cold room without any artificial seeding. Air temperature of the room was almost constant during each experiment but varied from experiment to experiment between -12°C and -18°C. The first ice crystal or crystals always appeared off the wall of the tray. As water surface was not protected from tiny fragments of hoar falling from the ceiling of the room, it was very probable that they may have acted as freezing nuclei. Water temperature at the appearance of ice crystals were -2.8—-2.9°C for sea water (8), -0.4—-1.8°C for city water (4) and -0.6—-1.8°C for distilled water (5). Figures in parentheses mean the number of experiments performed. Successive stages of ice growth were shadow-photographed until the surface was completely covered by ice 2-3 mm thick. Then, the formed ice rind was taken out and the etching method was applied to study its crystal structure. On the surface of sea ice, however, etch pits could not be obtained, suggesting that that surface of sea ice was probably coated by a thin film of brine. Plates I-II, III-IV and V-VI are examples of shadow photographs in case of sea water, city water and distilled water, respectively. Micro-photographs of etch pits produced on the surface of the ice rind, whose initial stages are shown in Pl. V-VI, are given in Pl. VII. Photographs in Pl. VIII show the discoidal ice crystals which appeared in distilled water when the latter was stirred with a cooled glass bar and (13) their later stage of growth (14). Numbers and habits of ice crystals and their modes of growth can be investigated from these photographs. Concerning crystal habits, results obtained here are in good agreement with those by other researchers. Systematic studies on the dependence of above mentioned factors (number, habit and mode of growth) on the grade of supercooling, the rate of cooling, the composition and concentration of solutes, etc. are now in progress and shall be reported in forthcoming papers. *Subject Headings: 1. Ice formation 2. Freezing of water.—Authors' abstract.*

12.2-191

551.326.85:539.3

Hitch, Robert D., **Flexural strength of clear lake ice.** *U. S. Snow Ice and Permafrost Research Establishment, Technical Report*, No. 65, July 1959. 8 p. 7 figs., 2 tables, 5 refs., eq. DWB, DLC—A total of 63 beams (24 in. long, 3 in. wide, and 4 in. deep) of lake ice of an average density of 0.915 g/cm³ were tested on a Young Hydraulic Testing Machine in a thermostatically controlled cold room for elasticity, yield point and flexural strength at temperatures of -5°C and -20°C, and the effects of temperature, crystal size, loading rate, and age were studied. The center deflection of the test beams and the load were measured simultaneously, and third-point loading was used to develop a more favorable distribution of bending stresses on the middle third of the beams. At -5°C the modulus of elasticity of beams of small crystal size increased with increasing loading rate, while flexural strength appeared to be unaffected. Beams of large crystal size showed small change in the modulus of elasticity at varying loading rates with no definite change in flexural strength. At -20°C higher strength values were obtained with increasing loading rate, and the modulus of elasticity was higher than at -5°C. The aging of ice had no effect on the results. *Subject Headings: 1. Lake ice 2. Strength of ice.—Author's abstract.*

12.2-192

551.5:656.61 (261)

Shipping operations in Hudson Bay. *Marine Observer*, London, 29(183):33-34, Jan. 1958. DWB, DLC—The 1957 Hudson Bay season reports release the fact that 46 ships made voyages to Churchill port and loaded full cargoes for European destinations. The frequent hazards encountered were ice and other normal risks of navigation. Meteorological data were collected. *Subject Headings*: 1. Marine meteorology 2. Shipping 3. Hudson Bay.—N.N.

12.2-193

551.556.8:551.465:551.326.7

Sawada, T., A method of forecasting the first date of the appearance of drift-ice area along the Okhotsk sea-side coast. *Journal of Meteorological Research, Tokyo*, 10(8):631-637, Aug. 1958. 7 figs., 2 tables, 5 refs., 2 eqs. In Japanese; English summary p. 631. DLC—Using reconnaissance aircraft, the author found that drift-ice areas along the Okhotsk Sea region during 1956 to 1958 moved south along the east coast of Sakhalin, and that the ice trajectory ran along the counter-clockwise current with a velocity of about 0.5 knot. He concluded that two possible methods of forecasting the appearance of drift-ice area are: 1) the velocity of current-induced drift made from the trajectory and 2) the velocity of wind-induced drift estimated from the prognostic weather map, after the ice area distribution in the open sea is investigated. Two factors, sea current and wind, are the main cause of drift-ice movement. *Subject Headings*: 1. Trajectory of ice-drift 2. Forecasting sea ice appearance.—K.C.

METEOROLOGICAL OBSERVATIONS AND INSTRUMENTS

METHODS OF OBSERVATION

See also: Antarctic stations (Alt), 12.2-12; Private weather station (Dursoko), 12.2-20; Visibility measurement Techniques (Slootmaekers), 12.2-40; Instrument maintenance (Shinners), 12.2-51; Temp. measurement (Fourré), 12.2-56; Fire danger rating tables (McArthur), 12.2-67; Use of wind generators at met. stations (Ivanov), 12.2-81; Radar signal strengths (Moler), 12.2-93; Hydromet. stations (Savenko), 12.2-172; Temp. trends comparison (Hrdá), 12.2-195; Global radiation calculations (Hinzpeter), 12.2-197; Global radiation measurement techniques (Bonnet), 12.2-204; Infrared radiation measurement techniques (La Rocca, Zissis), 12.2-208; Direct recording of turbulence intensity (Jones, Pasquill), 12.2-243.

12.2-194

551.501:551.46:778.3

von Arx, William S. (*Woods Hole Oceanog. Inst., Woods Hole, Mass.*), Synoptic photography. *Weather*, London, 13(6):179-197, June 1958. 9 figs., 8 refs., foot-ref. DWB—Details of the equipment and procedures for wide angle photography for use from ground, ship, airplane (or satellite or rocket) are discussed and nicely illustrated. The object space is considered to be spherical, perspective projections are illustrated, refracting systems in use described, stereoscopic effects discussed, time lapse and reflecting system created, the apparent or physiological vault of the sky and its discrepancy from the spherical shown graphically, and tests of whole sky or of laboratory model, photography illustrations and many applications in meteorology and oceanography cited. Wide field time lapse optical systems are being rapidly improved for use in airplanes and under sea. *Subject Headings*: 1. Synoptic photography 2. Wide-angle camera systems 3. Whole sky photography 4. Time-lapse photography.—M.R.

12.2-195

551.501.4:551.524.34

Hrdá, J., Užití metody Čebyševových polynomů při srovnávání tendence dvou dlouhodobých teplotních řad. [Use of Chebyshev's polynomial method in comparing the trends of two long temperature series.] *Meteorologické Zprávy, Prague*, 10(4):86-91, 1957. 2 figs., 4 tables, 5 refs., 8 eqs. Russian and German summaries p. 86-87. DWB—Like the method of the least squares, Chebyshev's method is a (more convenient) means of comparing two or more climatological records. The method is explained by applying it to average January and July temperature data for Prague, 1851-1900 as compared to 1901-1950. *Subject Headings*: 1. Temperature trends 2. Chebyshev's polynomial method 3. Long period temperature records 4. Prague, Czechoslovakia.—G.T.

12.2-196

551.501.71:551.508.91:551.510.42

Lunde, K. E. and Lapple, C. E. (*Stanford Res. Inst., Menlo Park, Calif.*), **Dust and mist collection; a critique on the state of the art.** *Air Pollution Control Association, Proceedings*, Vol. 50, 1957. Issued 1958? Paper No. 26 (9 p.). 3 figs., table, 17 refs. DWB (M10.42 A298ap)—Although many improvements in dust collection equipment have been made in recent years, they have been concerned primarily with mechanical details. There has been comparatively little follow-up of the theoretical developments in the design and application of equipment in practice. The single greatest deterrent to engineering rationalization of dust collection equipment design lies in the problems of measurement and interpretation of results. Any evaluation, either fundamental or empirical, which does not fully recognize these problems can yield very misleading results. Wide recognition of these problems, more extensive use of already available techniques for minimization of them, and greater emphasis on development of improved techniques should vastly improve our knowledge of collection equipment performance and should result in more economic and reliable designs and installations. To this end, there is presented a brief general summary of the basic performance principle of dust collection equipment, a discussion of the major problems in measurement techniques, and an indication of specific areas for potential development. *Subject Headings: 1. Dust collecting techniques 2. Dust meters.—Authors' summary and conclusion.*

12.2-197

551.501.721:551.521.1

Hinzpeter, Hans, **Die Berechnung der Globalstrahlung aus Registrierungen der Sonnenscheindauer.** [Computation of global radiation from records of sunshine duration.] (In: *International Radiation Conference, Davos, Sept. 1956, Papers. 1956.* (No. 6). 3 p. fig. Mimeo.) DWB (M21.1 161pa)—A method is developed whereby global radiation values can be computed from sunshine duration data, in cases where long records of sunshine duration but only short records of global radiation are available. *Subject Headings: 1. Global radiation calculations 2. Sunshine duration data.—G.T.*

12.2-198

551.501.81:523.531(420)(468.2)

Fitch, E., **The problem of introducing ionospheric scatter communication systems into the European frequency region.** *AGARDograph*, Paris, No. 26:43-56, July 1957. 9 figs., table, 3 refs. DWB (629.1332 N864a)—Radio propagation (at 37.3 Mc/s) by scatter from the ionosphere or meteor trails, and problems due to interference from local sources, troposphere, meteor trails, sporadic E, F₂, etc., both from a scatter system to other systems and to a scatter system are discussed. Based on 1955 studies at Malta and 1956 and 1957 from Gibraltar or Keflavik in England, conclusion is that choice of highest possible frequency minimizes these interferences and eliminates the F₂ layer interference. Examples of types of interference are shown on records. Careful site location (e.g., on a coast backed by a high cliff) will eliminate local interference. Most of the energy will come from meteor trail scatter and some from turbulent scatter. *Subject Headings: 1. Scatter wave propagation interference 2. Radio wave scattering by meteor trails 3. Gibraltar 4. England.—M.R.*

12.2-199

551.501.8:523.531(481)

Hagfors, Tor, **Some statistical results on reflections from meteoric trails obtained by forward-scatter experiments in Norway.** *AGARDograph*, Paris, No. 26:27-38, July 1957. 7 figs., 5 refs. DWB (629.1322 N864a)—Results of an investigation of the meteoric component of the VHF scatter signal received over a 1200 km path are presented. The following properties are analyzed: (a) total percentage of time during which the signal exceeds certain fixed levels; (b) the distribution of duration of the meteor bursts above some particular levels; (c) the distribution of time intervals between meteor echoes. Finally some deductions are made about the mass distribution of random meteors and about the constant of molecular diffusion at the height of meteor reflections. The meteoric signal is compared with the signal due to turbulent fluctuations of electron density. *Subject Headings: 1. Radio wave scattering by meteor trails 2. VHF radio wave scattering 3. Norway.—Author's abstract.*

12.2-200

551.5:629.13

551.501.81:656.7.08

Radar and the collision regulations: report of a Working Group (of British and French Institutes of Navigation and the Ausschuss für Funkortung). *Institute of Navigation, London,*

Journal, 12(3/4):221-337, July/Oct. 1959. **DWB, DLC**—The present paper is the report of a Working Group, set up at the recommendation of a conference held in London in June 1957, to study the desirability of amending the Collision Regulations and to take into account the use of radar. It consists of three appendices, A, B, and C. The proposed alterations and rearrangement are shown in Appendix A. The basis of rearrangement is to draw a clear distinction between the rules to be followed in clear visibility and in fog. The draft which is included as Appendix B, although not a part of the Collision Regulations, has been drawn up to formulate a guide to radar practice, to help seamen get the best possible value out of radar for anti-collision purposes. The French members of the group, while fully agreeing with everything in the guide, saw things from a slightly different angle and submitted another version of the guide, which is also reproduced here as Appendix C. *Subject Headings*: 1. Collision prevention at sea 2. Radar navigation regulations.—*I.S.*

OBSERVATIONAL DATA

See also: **Exped. data, Greenland** (Georgi), 12.2-6; **Exped. data, Antarctica**, 12.2-14; **Glacier-Met. obs., Switzerland** (Renaud), 12.2-180; **Climatic summaries, Mauritius** (Davy), 12.2-297.

12.2-201

551.506.1:551.582(54)

***India.** Meteorological Dept., **India Weather Review, Annual Summary, 1949, Pt. A, Summary of Weather with Tables.** pub. Delhi, 1955. 155 p. Almost entirely tables. **DWB**—This comprehensive summary of weather and data for India is almost identical with that for 1948 (*see* 6.3-42). Averages for 8:30 and 17:30, local time (pressure, temperature, wet bulb, VP, RH, cloud amount, rainfall, wind speed and frequency from 8 directions) for 200 stations arranged under 40 regions, and regional averages of precipitation and temperature, sunshine by hours (14 stations), nocturnal radiation temperatures at 1½" above ground (14 stations), hourly pressures, rainfall, rainfall frequency, wind speed and extreme winds, dry bulb, wet bulb and relative humidity; frequency of wind speeds, squalls, visibility (at Kodai-kanal) frequency of maximum wet bulb temperature, etc., at Calcutta there were 11 days with wet bulb temperature >55°F and on one day at Dum Dum Airport the dew point was 85.5°F, VP 31 mm (42 mb) with a temperature of 95°F. *Subject Headings*: 1. Annual climatic data summaries 2. Observational data 3. India.—*M.R.*

12.2-202

551.506.1:551.578.42

***India.** Meteorological Dept., **India weather Review, Annual Summary, Pt. B, Snowfall, 1951, 1952, and 1953.** Pub. Delhi, 1954, 1955, and 1955. 3 pieces, about 8 p. each. tables. Also *India Weather Review, 1948*, Introduction. pub. 1954. 6 p. (contains contents, and general introduction to the various parts of the **Annual Summary**). **DWB**—These annual snowfall summaries contain verbal and tabular data reported from a score of stations in the mountains of N. India (Jammu, Kashmir, the Punjab, Uttar Pradesh), by regions and seasons (cold period, Jan. Feb.; hot period, March-May; Monsoon period, June-July, and Aug.-Sept.; and post-monsoon period, Oct.-Dec.). Tabular data is provided where available. At Leh in June, 1952, the snowline was reported to be at 18,000 ft. In Jan. it was <10,000' and in Feb. 12,000' with 5' to 7' at 18,000 ft. *Subject Headings*: 1. Annual snowfall reports 2. Snowline data 3. Mountain meteorology 4. North India.—*M.R.*

12.2-203

551.506.1:551.515.1(54) 551.5:016

*†**India.** Meteorological Dept. **India weather review, 1951, Annual summary, Pt. C, Storms and depressions.** Delhi, 1955. 11 p. 13 tables, fig., 2 charts. Appended, List of publications of the India Meteorological Dept. as of Jan. 1955, including publications now out of print. (*See* 4.3-41, March 1953, *Met. Abstracts* for abstract on 1945 issue.) **DWB**—Case histories and selected data are given for 15 cyclonic storms or depressions in the Bay of Bengal or the Arabian Sea during the year of 1951, followed by an account of 3 western disturbances and statistics on 22 severe local storms, dust, hail or thunderstorms, gales or norwesters. An extensive list of about 500 publications, memoirs, bulletins or scientific notes of the India Meteorological Service to Jan. 1955 is appended. *Subject Headings*: 1. Annual meteorological data summaries 2. Cyclones of Indian seas 3. Bibliography of India Met. Service publications 4. India 5. Arabian Sea 6. Bay of Bengal. I. Basu, S.—*M.R.*

INSTRUMENT CARRIERS

See: Sec. B2, p. 235; **Drift ice met. stations** (Untersteiner), 12.2-8; **Drift ice met. stations** (Keller), 12.2-9; **Measurement of ambient air temp. in flight** (Howland), 12.2-37; **Airplane obs.** (Capp, Fetner), 12.2-39; **Ocean weather stations** (Frankcom), 12.2-52; **Airplane obs. of atmos. elec.** (Sagalyn), 12.2-425.

INSTRUMENTS

See also: **Ambient temp. measurement techniques** (Howland), 12.2-37; **Barographs** (Shinners), 12.2-51; **Solar radio interferometers** (Wild, Sheridan), 12.2-96; **Dust collecting techniques** (Lunde, Lapple), 12.2-196; **Cyclone effects on altimeter readings** (Gherzi), 12.2-342; **Technology for study of simulated atmospheres in closed chambers** (Thuman, Cadle), 12.2-385; **Dust measurement with pyrheliometers** (Kitaoka), 12.2-419.

12.2-204

551.501.721:551.508.21

Bonnet, G., **La mesure de la radiation globale avec le pyranomètre Bellani**. [Measurement of the global radiation with the Bellani pyranometer.] *Journal de Mécanique et de Physique de l'Atmosphère*, Paris, Ser. 2, 1(2):101-107, April/June 1959. fig. French, English and Spanish summaries p. 101. DWB—Thanks to an adequate preliminary calibration, Bellani's spherical pyranometer can be used for measuring the global radiation on a horizontal surface. However, various factors as insolation, sun declination, albedo of the earth provoke the dispersion of the calibration coefficient obtained with a solarimeter. On this account, certain precautions should be taken for such a calibration. He has stated them in this article. *Subject Headings*: 1. Global radiation measurement techniques 2. Bellani's pyranometer 3. Lwiro, Belgian Congo.—A.V.

12.2-205

551.508.21

Stratmann, H., **An apparatus for the continuous measurement of solar and sky radiation in various spectral regions**. (In: Conference on the Use of Solar Energy, Univ. of Arizona, 1955, Transactions, pub. 1958. Vol. 1:43-47. 2 figs., table.) DWB—An apparatus that has a measuring range of 1 to 1 million with uniform sensitivity is described. It is intended for the continuous measuring and recording of the solar and sky radiation in six different regions between 3500 and 8000 Å in order to determine the radiation used for photosynthesis and spectral variations of daylight. It measures every 20 sec the intensity of radiation in W/cm² (Watts per square centimeter). *Subject Headings*: 1. Radiation instruments 2. Radiation intensities 3. Solar radiation 4. Sky radiation.—N.N.

12.2-206

551.508.23

551.521.11:551.513.1

Schindler, Gerhard (*Offenbach*), **Über die Möglichkeit von Fehlerquellen bei der Feststellung der Sonnenscheindauer**. [Possible sources of error relating to the measurement of sunshine-duration.] *Annalen der Meteorologie*, Hamburg, 8(5/6):190-191, 1958. 6 refs. DWB, DLC—Occasionally long period records of sunshine duration give the impression of increasing sunshine duration. Before conclusions concerning actual increases in sunshine duration can be made sources of instrumental and personal error must be eliminated. The homogeneity of an observation series must be tested (the horizon may be changed by construction of buildings etc.). An increase or decrease in sunshine duration may result from a change in the recording instrument; transparency of the spheres may alter; different instruments may have different recording thresholds. Dew or rime on the sphere may alter the instrumental values. In evaluation of the records, subjective difficulties may arise from different evaluation procedures and also from subjective errors. The latter are accompanied by an instrumental lack of precision associated with intermittent cloudiness during which the time of the "sunning" may either be over- or under-estimated. The intensification of the atmospheric circulation may lead to more frequent intermittent sunshine and to apparent increase in sunshine duration. An eventually intensified polar tendency of the Azores High would bring about a true increase in sunshine duration. *Subject Headings*: 1. Sunshine duration measurement 2. Atmospheric circulation effects on sunshine duration.—I.L.D.

12.2-207

551.508.25:681.2.087

Kassander, A. Richard and Knowles, Lyle L. (*both, Inst. of Atmospheric Physics, Univ. of Arizona*), **An automatic printing and totalizing device for solar radiation measurements.** (In: Conference on the Use of Solar Energy, Univ. of Arizona, 1955, *Transactions*, pub. 1958. Vol. 1:48-59. 4 figs.) **DWB**—A device is presented which performs the time integration operation when hourly totals of incoming solar radiation are desired. This device, which is attached to a standard self-balancing potentiometer type of recorder, samples the record each minute and prints out the indicated value. After sixty such samples are taken the total is then printed as well as the time of the day. The operation starts and stops automatically at pre-set dawn and dusk. *Subject Headings:* 1. Solar radiation measurements 2. Automatic radiation recorders 3. Totalizer radiation recorders.—*N.N.*

(For abstract on this title from another source, see 8.6-218, June 1957, *Met. Abstracts*)

12.2-208

551.501.721:551.508.25

LaRocca, A. and Zissis, G. (*both, Mich. Univ., Willow Run Labs., Ann Arbor*), **Field sources of blackbody radiation.** *Review of Scientific Instruments*, N. Y., 30(3):200-201, March 1959. 2 figs., 4 refs. **DWB**—Infrared radiation distribution has been measured by radiometric means using two large area thermal radiation sources, namely: an ambient-temperature conical field source and a temperature-controllable conical field source. The design and construction of these sources are shown in this communication. The controllable temperature was selected within the range of 10 to 90°C. The resulting value of 0.99 has led to the assumption of unity for field uses of such sources. *Subject Headings:* 1. Infrared radiation measurement techniques 2. Black body radiation.—*N.N.*

12.2-209

551.508.29:551.524.37

Goll, György, **A fagyástjelző tányér használatáról.** [Use of the frost warning plate.] *Időjárás*, Budapest, 63(5):309-310, Sept./Oct. 1959. 2 refs. **DLC**—The mercury plate is made of aluminum and is 2 mm deep. The plate has to be filled with water around midnight. The freezing of the water is the warning to start the necessary action to eliminate the dangers of frost. The instrument is simple and inexpensive. The simultaneous application of several frost mercury plates is very useful. *Subject Headings:* 1. Frost instruments 2. Frost danger.—*E.K.*

12.2-210

551.584:551.508.29:536.53

Höhne, Werner (*Univ. for Agric. Met. Halle/a.S.*), **Technische Hilfsmittel bei mikro-meteorologischen Temperaturmessungen mit Thermoelementen.** [Supplementary devices for micro-meteorological temperature measurements using thermocouples.] *Időjárás*, Budapest, 62(4):195-206, July/Aug. 1958. 6 figs. (incl. photos), 10 refs., eqs. English summary p. 195; Hungarian summary p. 205. **DLC**—The effect of stray secondary thermoelectric forces and the possibilities of their avoidance, and also the accomplishment and evaluation of the thermocouple calibration are treated. The following supplementary devices are described: a waterproof plug-contact with terminal screws to connect the measuring elements with the copper and constantan leads, a thermostat to keep the reference junction at a constant temperature and a detachable mounting to suspend the measuring element in microclimatological measurements of temperature gradients. *Subject Headings:* 1. Micrometeorological temperature measurement techniques 2. Micrometeorological instrumentation 3. Thermocouples.—*Author's abstract.*

12.2-211

551.524.4:551.508.29:536.53

*Johnson, Neil R.; Weinstein, Alvin S. and Osterle, Fletcher, **Influence of gradient temperature fields on thermocouple measurements.** Carnegie Institute of Technology. Dept. of Mechanical Engineering, Contract AF 18(600)-969, Final Report, Pt. 3, Sept. 1957. 30 p. 7 figs., 3 tables, 2 refs., 27 eqs. **DWB** (M(055) C289s)—It has been found that appreciable errors can occur in thermocouple measurements of gas temperatures due to conduction of heat along the wires from the thermocouple head. Error formulas are derived for various temperature gradients by bending the thermocouple leads downstream after going upstream a specified distance. Nomograms, tables and graphs give quantitative data derived for a

uniform stream and for linear, truncated linear, exponential, and truncated exponential gradients. *Subject Headings:* 1. Thermocouple errors 2. Temperature gradient effects on thermocouple accuracy.—M.R.

12.2-212

551.508.56/57

Huovila, Seppo (*Vaisala Oy.*), **Comparison with optical theodolite.** *Vaisala News*, Helsinki, No. 4:8-9, Dec. 1959. 2 tables.—This paper reports two investigations concerning the accuracy of the radiotheodolite, wherein parallel observations were made with a well adjusted optical theodolite and the radiotheodolite, and then, the actual deviations computed. One of these was a minor investigation made by Du TOIL in Marion Islands and Swakopmund in South Africa and the other was a more detailed investigation by Rossi made in Jokioninen in Finland. *Subject Heading:* 1. Theodolite observation errors.—I.S.

12.2-213

551.508.57

Flowers, E. C. and Hansen, H. (*USWB, Amundsen-Scott IGY Station (So. Pole), Antarctica*), **Comparison of various conditioning methods for rawinsonde balloons: Results from the South Pole station, Antarctica, 1957.** *Monthly Weather Review*, Wash., D. C., 87(7):261-267, July 1959. 8 figs., 5 tables, 3 refs. DWB, DLC—Various methods of conditioning the rawinsonde balloon were tried at the Amundsen-Scott IGY Station (South Pole), Antarctica, in an attempt to improve sounding heights. During the dark, cold months, conditioning of the balloon in warm diesel fuel proved significantly better than the conventional conditioning methods. However, with the return of sunlight and the rapid warming of the stratosphere, diesel fuel conditioning was found to be inferior to the boiling water or moist heat-box method of balloon conditioning. *Subject Headings:* 1. Rawinsonde improvements 2. Rawinsonde balloon conditioning 3. Antarctica.—Authors' abstract.

12.2-214

551.508.57

Ingman, Lassi (*Vaisala Oy, Radio Engineer*), **Operational principles and radiotechnical construction of the Radiotheodolite.** *Vaisala News*, Helsinki, No. 4:3-6, Dec. 1959. 7 figs., 2 eqs.—An illustrated discussion of the radiotheodolite phase measurement method. The necessary information concerning the azimuth and elevation angles of the Vaisala Radiosonde is obtained by tracking it with the Radiotheodolite. Radiotheodolite is also employed for measuring the phase of the radiosonde signal at separate antennas and the radiosound signal frequency. The phase measurement is carried out on the phase comparison principle. *Subject Heading:* 1. Radiotheodolites.—I.S.

12.2-215

551.508.765:551.578.11

Deloncle, Madeleine, **Granulonébulomètre photoélectrique.** [Photoelectrical granulonebulometer.] *Académie des Sciences, Paris, Comptes Rendus*, 250(13):2409-2411, March 28, 1960. 2 figs., 4 refs. DWB, DLC—Description of an instrument, called granulonebulometer, based on optic and photoelectric principles permitting the counting and the measurement of water droplets. The instrument comprises a microscope, a lighting device, a rectangular diaphragm and a fan permitting to suck up a flow of free droplets suspended in a stream of air. The luminous flux, scattered by each of the droplets when it passes in the field of the microscope is sent upon a photomultiplier by a system of mirrors and lenses. The signal given by the photomultiplier is received by an oscilloscope of which the screen is photographed. The apparatus has been calibrated using known sized droplets secured against motion by means of spider-lines, this enabling to draw a curve $S=f(d)$, where S designates the amplitude of the signal expressed in millivolts, and d the diameter of the corresponding drop. *Subject Headings:* 1. Drop size measurement 2. Drop size meters.—A.V.

12.2-216

551.508.77

Adkins, C. J. (*Cavendish Lab., Cambridge*), **A rate-of-rainfall recorder.** *Royal Meteorological Society, Quarterly Journal*, 85(366):419-420, Oct. 1959. 2 figs. DWB, DLC—In certain atmospheric and geophysical studies it is desirable to have an accurate rate-of-rainfall recorder which can function for long periods unattended, which can respond within a few seconds to changes in rainfall and which can provide records of good time resolution. The

instrument described in this paper was designed to meet these requirements. *Subject Headings:*
1. Rainfall recorders 2. Rainfall intensity gages.—*Author's abstract.*

12.2-217

551.508.79:551.579.2

Ambach, Walter, **Zur dielektrischen Bestimmung des Schmelzwassergehaltes einer Schneedecke.** [The dielectric determination of the liquid water content of snow cover.] *Germany. Deutscher Wetterdienst, Berichte*, 8(54):18-20, 1959. 2 figs., table, ref. German and English summaries p. 18. **DWB, DLC**—The method consists of the measurement of the capacity of a condenser whose dielectric is the sample of snow to be tested. Since the dielectric constant is a function of the liquid content of the snow, the apparatus may be used to measure this liquid content, once it has been calibrated. The author also reports the laboratory work in which the best measuring situation was determined. In the second part of this article the author reported comparative measurements of superimposed ice heat of fusion, with the winter heat loss of glaciers. Finally, the author discussed the meaning of the superimposed ice for the mass and energy budget of the glacier. *Subject Headings:* **1. Water content of snow cover measurement 2. Heat loss of glaciers 3. Water supply from snow cover.**—*Author's abstract.*

12.2-218

551.508.822

Fournier, P., **Les essais climatiques.** [Climatic trials.] *L'Onde Electrique*, Paris, 40(395):212-215, Feb. 1960. 12 figs. **DLC**—The field of research in climatic testing in electronics is actually in full swing because of its great demand by the users. The terminology of climatic testing is explained. These tests aim at determining the extreme performances of the apparatus. Climatic tests are not only used to check the behavior and response of the equipment under various conditions, but also in special cases to carry out preliminary testing, essential to the user. As an example the testing of radio-sondes is mentioned. *Subject Headings:* **1. Climatic controls 2. Radiosonde calibration.**—*A.V.*

12.2-219

551.508.822:621.355

Leonov, V. S.; Bulichev, V. N.; Groshev, P. M. et al., **Vosstanovlenie dolgo khranivshikhsia sukhikh batarei pitaniia radiozondov.** [The recharging of dry-cell radiosonde batteries which have been stored for long periods of time.] *Meteorologiya i Gidrologiya*, Leningrad, No. 1:49-50, Jan. 1959. **DWB, DLC**—Batteries with steady but not too rapidly diminishing voltage are easily renewed if in the course of three hours they are recharged by a current of about 30 milliamperes flowing opposite to the direction of the current of the charge. Any rectifier giving a suitable constant charge can be used in recharging. The procedure for recharging different types of batteries and for testing them is described. *Subject Heading:* **1. Radiosonde batteries. I. Khakhalin, V. S.**—*I.L.D.*

122.2-220

551.508.86:621.396.8

Carbenay, Fernand, **Enregistrement de la valeur quadratique moyenne du bruit atmosphérique.** [Recording of the mean quadratic value of atmospheric noise.] *Académie des Sciences, Paris, Comptes Rendus*, 249(1):67-68, July 6, 1959. 2 refs. **DWB, DLC**—Statement of the functioning principle and description of the principal parts of a device for recording atmospheric noise. The square of the stream intensity of atmospheric noise amplified on a given frequency is recorded by means of thermo-couples. The photographic process requiring only a weak galvanometric power, the tensions brought in action within the receiver are compatible with the linearity of amplification, and the power supplied to the thermo-couples remains within the admissible limits. *Subject Headings:* **1. Atmospheric noise 2. Sferics recording equipment 3. Thermocouple amplifiers.**—*A.V.*

12.2-221

551.508.91:551.510.42:551.510.53

Challande, René and David, Benjamin, **Nouvelle méthode de prélèvement des particules solides dans la stratosphère.** [New method of sampling solid particles in the stratosphere.] *Académie des Sciences, Paris, Comptes Rendus*, 250(8):1520-1521, Feb. 22, 1960. 3 refs. **DWB, DLC**—Description of an instrument and an account of a method permitting to pick up simultaneously in the same experiment microscopic and submicronic solid particles, using the

properties of an ionized electric field, under the conditions created by the rarefied air. The precipitating apparatus is made of a tube with an ionizing axial thread. The particles bigger than 0.5μ settle according to their decreasing size while the submicronic particles, charged more slowly, settle according to their increasing size. The particles are gathered on object-slides of an electron microscope, regularly disposed in small cavities on a generating line of the tube. The ionizing field depends on the ionizing current, which itself depends on the pressure. The collection of dust has been made between the extreme altitudes of 9800 to 13,800 meters. This layer contains structureless dust, individual crystals and crystal-combinations with size inferior to a micron. On the average, there are 350 particles with sizes larger than 5μ in each liter of air. *Subject Headings: 1. Particle counters 2. Particle size determination 3. Stratospheric composition.*—A.V. ©

12.2-222

551.508.91:551.510.42

Gruber, Charles W. and Jutze, George A. (both, Cinn., Ohio), **Use of sticky paper in an air pollution monitoring program.** *Air Pollution Control Association, Proceedings*, Vol. 50, 1957. Issued 1958? Paper No. 7 (4 p.). 3 tables. DWB (M10.42 A298ap)—An example of the standardized use of sticky paper in an air pollution monitoring program is given. The steps to be followed in the choice of sampling sites, the type of instruments used, their installations and operations are outlined. This survey covers a period of 15 weeks. From it has been drawn the best way of reporting the results of such investigations, taking into consideration the data for the cleanest and dirtiest periods in order to arrive at good yearly averages for the dust fall. *Subject Headings: 1. Atmospheric pollution studies 2. Air sampling instruments.*—N.N.

12.2-223

551.508.91:551.574.1

Jiusto, James E. and Pilié, Roland J. (both, Cornell Aeronautical Lab., Inc., Buffalo, N. Y.), **Condensation nuclei experiments with simple apparatus.** *Weatherwise*, Boston, 11(6):206-208, 217, Dec. 1958. 3 figs., 3 refs. DWB—A variable humidity apparatus which can be constructed by a student meteorologist for studying condensation phenomena or for hygroscopic nuclei measurements is described and illustrated. An air current is forced by an electric hair dryer through a 4 ft copper tubing $\frac{3}{8}$ in. in diameter. One branch of the air stream leads to an instrument box with a psychrometer, and the other to a specimen slide. A mixing chamber made of a cigar box coated inside with moisture repellant rubber base paint makes an even distribution of water vapor in dry air. Water is boiled in a flask over a Bunsen burner or a hot plate by using a rubber tubing with a pinch clamp, relative humidity up to 98% can be obtained. Slides are exposed and magnification up to $43\times$ power used to observe particles down to 0.5μ . Other methods and a few experiments are described. *Subject Headings: 1. Condensation nuclei apparatus 2. Condensation nuclei experiments.*—M.R.

12.2-224

551.508.91:551.510.42(436.14)

Steinhauser, F. (*Zentralanstalt f. Met. & Geodyn, Vienna*), **Messungen der Staubablagerung in Wien.** [Measurement of dust deposits in Vienna.] *Időjárás*, Budapest, 63(2):94-99, March/April, 1959. fig., table, 5 refs. English summary p. 94; Hungarian summary p. 98-99. DLC—Measurements of wind deposits in different parts of the area of Vienna are discussed. These measurements were carried out by exposing glasses of the diameter of 3-15 μ with sintered-glass bottom for a period of half a year each. On the basis of these measurements the considerable differences in the amount of wind deposits in the different parts of the town, and the big differences between the winter and summer semesters are discussed and analysed. Results of measurements made on several places of the town by the aid of Zeiss-Konimeter are discussed, showing very distinct local differences. In case of snow-cover a considerable decrease of the dust percentage of the air was observed. *Subject Headings: 1. Dust meters 2. Atmospheric pollution instruments 3. Vienna, Austria.*—Author's abstract.

12.2-225

551.508.92:551.591

Piatovskaia, N. P., **Sravnenie instrumental'nogo i vizual'nogo metodov opredeleniia dal'nosti vidimosti.** [Comparison of instrumental and visual methods of determining visi-

bility.] *Meteorologia i Gidrologiia*, Leningrad, No. 11:50-52, 1958. 2 tables, 6 refs. **DWB, DLC**—The results of determinations of visibility distance, S_M , by means of a visibility meter, developed by V. A. GARRILOV, and by means of a visual method, which uses a 5 ball scale intensity of atmospheric haze over objects, are presented. Six objects projected against the sky were used; they included a near and far tower, groups of trees and different types of forests. In the case of the visual method S_M was obtained as a weighted mean of all observations for the different objects for a given time of observation, when the instrument was used S_M was obtained for each object separately and the arithmetic mean S_M was computed for all objects for a given time. When snow or extensive atmospheric haze covered the objects the results of both agreed in practically all cases. Also on days with very clear atmosphere these methods did not give contradictory results. *Subject Headings: 1. Visibility meters 2. Visibility measurement techniques.—I.L.D.*

12.2-226

551.508.93:551.510.42

†O'Konski, C. T.; Bitron, M. D. and Higuchi, W. I. (all, *Dept. of Chemistry, Univ. Calif.*), **Light scattering instrumentation for particle size distribution measurements.** *American Society for Testing Materials, ASTM Special Technical Publication*, No. 250, 1959. p. 2-28. 10 figs., 5 tables, 48 refs. **DLC**—An improved instrument is described for the characterization of particles suspended in gases by means of light scattering. It consists of (1) a sensitive right-angle optical system with a photomultiplier detector, (2) a coaxial flow system which facilitates variation of the particle concentration range, (3) a photometer which continuously records the average light scattering signal, and (4) a pulse analyzer for size discrimination of individual particles. The particle analyzer was calibrated with uniform polystyrene spheres from a 0.33 to 1.17μ in diameter, employing air as a scattering standard. The scattering intensity was found to be approximately proportional to the square of the diameter. Resolving power was determined as a function of particle size, and the instrument was critically evaluated. A brief review of particle detectors is given. A versatile pulse height selector system is described. Some variations of the instrument are proposed. *Subject Headings: 1. Atmospheric pollution instruments 2. Light scattering recorders 3. Particle size distribution measurement.—Authors' abstract.*

12.2-227

551.508.953 535.33.018

†Primas, H.; Arndt, R.; and Ernst, R., **Die Konstruktion von Kernresonanz-Spektrographen hoher Auflösung.** [Construction of high resolution nuclear resonance spectrographs.] *Zeitschrift für Instrumentenkunde*, Braunschweig, 67(12):293-300, Dec. 1959. *Ibid.*, 68(1):8-13, Jan. 1960. *Ibid.*, 68(2):21-29, Feb. 1960 and 68(3):55-62, March 1960. 39 figs., 4 tables, 246 refs., eqs. German, English and French summaries. **DLC**—A review of the recent development in high resolution nuclear magnetic resonance (nmr) instrumentation is given. There are no theoretical derivations but the results are presented in a form useful for the designer. In the first part the requirements and the construction of nmr-magnets are discussed. The various methods of homogenizing and stabilizing magnetic fields are reviewed. The construction of the high frequency system of high resolution nmr spectrographs is described in the second part. Some theoretical and electronic problems of nmr instrumentation are dealt with in the third part. Such topics of recent interest as radiation damping, integration of nmr spectra, optimal signal-to-noise ratio, etc., are included. *Subject Heading: 1. Spectrographs.—Authors' abstract.*

12.2-228

551.508.95:546.264

Ubl, Zdeněk, **Panelový aparát na stanovení kysličníku uhličitého.** [Stationary apparatus for carbon dioxide determination.] *Meteorologické Zprávy*, Prague, 12(2/3):60-61, 1959. 2 figs., 2 refs. **DWB, DLC**—The apparatus described and illustrated (schematic diagrams) was constructed by the author and B. KESNER. It measures atmospheric CO_2 content with an accuracy within 0.01%. For individual measurements the error does not exceed 0.003%. The instrument can be operated by personnel having no special training. It has been in use with good results at the Czechoslovak Institute of Public Health for the last two years. *Subject Heading: 1. Carbon dioxide apparatus.—G.T.*

12.2-229

551.508.99:582.47:551.509.324.2

Nadeliaev, K. M., *Estestvennyi barometr.* [A natural barometer.] *Priroda*, Moscow, 47(3):100, March 1958. 2 figs. **DLC.** Review by S. A. Malik in *Meteorologiya i Gidrologiya*, No. 11:63-64, 1958.—The capacity of reacting to weather manifested by conifers, such as the fir which lower their branches before rain and raise them before clear weather, is retained by the dry tree which can be used as a natural barometer. Accordingly, a small section of the stem of a fir with a twig is cut out, the bark is removed from the twig and the stem is attached to a holder. The fastened hole responds to weather by lowering the branch before rain and raising it before good weather. A graduated sheet is set up in front of the free end of the branch so that the movements can be recorded quantitatively. A diagram of this natural barometer and a curve showing daily movements of the bole are presented. The motions and the actual relationship to rain forecasts are indicated. *Subject Headings: 1. Natural barometers 2. Firs 3. Precipitation forecasting.—I.L.D.*

12.2-230

551.508.99:551.579.5

Vilkner, Hans, *Erdbodenfeuchtigkeitsmessung mittels elektrischer Leitfähigkeit.* [Soil moisture measurement by means of electrical conductivity.] *Zeitschrift für Meteorologie*, 13(7/8):163-177, July/Aug. 1959. 14 figs., 5 tables, 6 refs. German and English summaries p. 163. **DWB, DLC**—A description is given of an equipment for measuring the moisture content of the ground utilizing the electrical conductivity of ground. The distinguishing features of this instrument as compared to similar ones are its greater measuring volume eliminating the effects originating from irregularities inside the ground, and its automatically working temperature compensating device which considerably simplifies the measuring procedure. While the body of the instrument may be of the stationary or portable type the electrodes have to remain in the ground. Evidence is given that ground sondes which do not permanently remain in the ground cannot be expected to supply reliable results. Examples are given for the determination and continuous observation of the extent precipitation affects and penetrates into the ground, of the effects of evaporation, and of moisture gradient. The results are considered to be useful for the definition of drought periods. The principle described may be utilized for establishing a warning system when drought is imminent, for the construction of devices indicating the effects of irrigation, and for automation of irrigation. *Subject Headings: 1. Soil moisture instruments 2. Electrical conductivity of soil.—Author's abstract.*

SYNOPTIC ANALYSIS AND FORECASTING

See also: Private weather station (Duroska), 12.2-20; *Television weather broadcasts* (Jehn), 12.2-21; *German Marine Weather Service* (Seilkopf), 12.2-54; *Rainfall probability forecasts* (Turner), 12.2-68; *Radar synoptic analyses* (Jehn), 12.2-92; *Water temp. forecasting* (Hishida), 12.2-153; *Water supply forecasts* (Dwyer), 12.2-167; *Lake current forecasting, Lake Michigan* (Platzman), 12.2-178; *Forecasting sea ice* (Sawada), 12.2-193; *Precip. forecasting* (Nadeliaev), 12.2-229; *Synoptic structure of typhoons* (Sekioka), 12.2-308.

12.2-231

551.509.2/3(02)

Il'inskii, O. K., *Nekotorye zamechaniia o soderzhanii uchebnikov sinopticheskoi meteorologii.* [Some comments on the content of textbooks on synoptic meteorology.] *Meteorologiya i Gidrologiya*, Leningrad, No. 7:59-60, July 1958. **DWB, DLC**—The author presents various general comments on the contents of textbooks on synoptic meteorology in connection with the publication of *Sinopticheskoi meteorologii* by A. S. ZVEREV. Textbooks on synoptic meteorology should not be overloaded with technical problems such as the construction and analysis of different types of maps, graphs and diagrams required in practice. Technical problems and analysis of operational synoptic material should be provided, not in a course on synoptic meteorology, but in special books on synoptic practice. This does not mean that the sections on synoptic forecasting should be removed from synoptic meteorology textbooks; they should be treated thoroughly in each textbook. It is no longer necessary that synoptic meteorology textbooks contain sections on dynamics and thermodynamics of the atmosphere, since these aspects are discussed adequately in general courses of meteorology. Instead they

should consider these subjects strictly in relation to synoptic problems. A special topic not considered by ZVEREV is that of the geography of synoptic processes. Only in the consideration of the regional characteristics of synoptic processes is it possible to see the general atmospheric circulation in concrete geographic conditions and to see the interaction of the underlying surface with the atmosphere. *Subject Heading: 1. Synoptic meteorology textbooks.—I.L.D.*

12.2-232

551.509.3:551.515.8(497.1)

Čadež, M., *Sur l'importance des études systématiques des invasions d'air froid pour l'analyse et la prévision du temps.* [The importance of systematic studies on cold air invasions for weather analysis and forecasting.] *Simposio Internazionale sulla Fisica delle Nubi e Relative Applicazioni all'Agricoltura*, Asti, Italy, April 1958, Atti, pub. Dec. 1958. p. 111-121. 3 figs., 5 tables, 4 refs. English and Italian summaries p. 121.—The results of systematical researches of invasions of cold air on the territory of Yugoslavia in 1951 and 1952 are discussed. Data of frequency of invasions, of velocity of cold front, of average weather development in the days before and after the day when the invasions of cold air from NW occurred, etc., are given. *Subject Headings: 1. Cold air invasions 2. Yugoslavia.—Author's abstract.*

12.2-233

551.509.31

*§George, J. J., *Further studies in the development of shortrange weather prediction techniques.* Eastern Air Lines, Inc., Meteorology Dept., Contract AF 19(604)-2073, Final Report, June 1959. 109 p. 60 figs. DWB—The Short-Range Forecasting Project No. AF 19(604)-2073 has been completed. Two Scientific reports, four informal status or interim reports and a final report have been submitted on eleven forecast problems. The shift of emphasis from prediction of synoptic pressure features to the prediction of weather is evident in that two of the studies were concerned with the former and nine with the latter. New methods were developed for prediction of 30-hour movement of hurricanes and the intensity of certain types. Two studies attacked certain weather features for two geographic areas by means of analogue techniques. The remainder of the research was concerned with prediction of general fog and low ceilings, heavy snow, types of precipitation, fog at two United Kingdom bases and Selfridge Field, the preparation of area weather prognostic charts with emphasis on warm frontal weather and high level wind analysis. Most of the studies include objective techniques for their application and were developed by empirical processes. Routine use of many of the studies have proved their value. *Subject Headings: 1. Short range forecasting techniques 2. Hurricane movement forecasting 3. Fog forecasting.—Author's abstract.*

12.2-234

551.509.31:551.515.23(266)

§†Typhoons and tropical storms of the western North Pacific, 1958. *Mariners Weather Log*, Wash., D. C., 3(3):68-75, May 1959. 5 figs., table. DWB—The area is defined as that from the east coast of Asia eastward to 160°E, and from the equator northward to the pole. The tracks of the 21 storms here during 1958 are plotted on six maps, tabulated by name, date, locations affected, speed, lowest surface and 700 mb pressures. The individual storms are subsequently discussed in terms of summarized synoptic conditions. *Subject Headings: 1. Synoptic conditions for typhoons 2. Typhoons, North Pacific 3. North Pacific.—W.N.*

12.2-235

551.509.312:551.513.1

Monin, A. S. and Obukhov, M., *Malye kolebaniia atmosfery i adaptatsiia meteorologicheskikh polei.* [Small atmospheric fluctuations and the adaptation of meteorological fields.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 11:1360-1373, Nov. 1958. 8 refs., 44 eqs. DLC. Transl. into English by John Miller, issued by American Meteorological Society under Contract AD 19(604)-1936, March 1959. 18 p. Complete. Also transl. into English in the corresponding number of the *Akademiia Nauk SSSR, Bulletin of the Academy of Sciences, USSR, Geophysics Series.* DLC—The dynamic processes in the atmosphere (horizontal vortical motion, gravitational and acoustic waves) are classified into general fundamental types by solving the problem of small oscillations of a baroclinic atmosphere. A general form of invariant is found, by means of which it is possible to compute for any initial data, a given stationary condition of the atmosphere without analyzing wave processes causing the reorganization of fields. The "filtering" role of the quasistationary approximation is explained;

it filters out the internal acoustical waves and raises somewhat the frequency of the gravitational waves. It is shown that the time for the establishment of quasistationary equilibrium in the atmosphere amounts to only a few minutes. *Subject Headings: 1. Baroclinic atmosphere 2. Circulation types.*—*Transl. of author's abstract.*

12.2-236

551.509.313

Marchuk, G. I. and Kireeva, N. M., **K voprosu o razlozhenii po malomu parametru reshenii sistemy uravnenii gidrotermodynamiki primenitel'no k atmosferynym protsessam.** [Small-scale analysis in solving a system of hydrothermodynamic equations in connection with atmospheric processes.] *Akademiia Nauk SSSR. Institute Fiziki Atmosfery, Trudy*, No. 2:142-159, 1958. 19 figs., 2 refs., numerous eqs. **DLC** (Slavic)—The authors present a method of solving the equation of hydrodynamics (applicable to short range forecasts) based on expansion by stages of a small parameter and taking into account the three dimensionality and vertical baroclinicity of the atmosphere. The mathematical development of the problem and its solution are presented. *Subject Headings: 1. Short range forecasting 2. Hydrodynamic equations.*—*Editor's abstract and I.L.D.*

12.2-237

551.509.318

Holland, James S. and Mills, Lewis L., **Hemispheric study of weather types.** Photostat (ASTIA) of unidentified source. (1959?) 165 p. 60 figs., 12 refs. **DWB** (M09.318 H735he)—Existing Northern Hemisphere weather types are modified, where necessary and new types developed to give complete coverage of both the surface and 500 mb flow. A new classification system is devised. The possible use of these types on a hemisphere basis is explored, and recommendations for future study are made. It is to be noted, that in every sense this paper represents a joint effort by the authors. The authors are deeply indebted to W. D. DUTHIE Chairman, Department of Aerology, U. S. Naval Postgraduate School, for his invaluable aid in the preparation of this manuscript. *Subject Headings: 1. Northern Hemisphere analysis 2. Weather type classification.*—*Authors' abstract.*

12.2-238

551.509.318:551.577.37(497.2)

Stefanov, Stefan I., **Sinoptichni usloviia na dve izvürnedno intenzivni i prodölzhitelni valezhni obstanovki prez 1957 g., prichinili na mesta v NRB stikhiini navodneniia.** [Synoptic conditions for two cases of unusually intense and prolonged precipitation in 1957 which caused major floods in some parts of Bulgaria.] *Khidrologiia i Meteorologiia*, Sofia, No. 2:27-41, 1958. 6 figs., 2 tables. Russian and English summaries p. 40-41. **DLC**—The article presents a synoptic analysis of two intense precipitation periods in Bulgaria (June 26-29, and Sept. 4-8, 1957). In many places the amount of precipitation exceeded 200 l/m². Over the whole country it is estimated at 8-10 milliard (billion) tons for each of the precipitation periods, which represents $\frac{1}{3}$ of the annual precipitation. The first precipitation was associated with a well defined polar inflow of arctic maritime air. The precipitation mechanism was activated by transfer of moist tropical air aloft outside the friction layer, and by cold moist air from the region east of Greenland. The precipitation occurs when there is a cold Arctic anticyclonic wedge from the north and an upper trough outside the friction layer. Precipitation ceases when the surface in and outside the friction layer up to and over 3000 m becomes uniform in airmass characteristics, or when the curvature of the surface and upper-air (up to 700 or 600 mb) isobars and isohypes acquire anticyclonic curvature. The second precipitation occurred in connection with a cyclone originating above a cold region over the Adriatic, which moved over Bulgaria and dissolved there. The main peculiarity of this precipitation system was the quick development of the upper cyclone and its transition into a stationary state over the Balkan peninsula with an active transfer of cold air in its rear and of warm air in its front, especially in the friction layer. *Subject Headings: 1. Synoptic conditions for precipitation 2. Excessive precipitation 3. Bulgaria.*—*From author's abstract.*

12.2-239

551.509.322:551.515.3/4

Fawbush, Ernest; Miller, Robert C. and Starrett, Loyd G. (all, *Air Weather Service, U. S.*), **Severe weather forecasting.** (In: Angola. Serviço Meteorológico, *Miscelanea geofísica*. Luanda, 1956. p. 229-250. 7 figs., 2 refs.) **DWB** (M(08) A592mi)—Some results

of seven years of experience in the forecasting of severe local storms at the Severe Weather Warning Center are presented. The forecast problem is divided into stages and discussions are given of techniques, problems, and results peculiar to each. *Subject Headings: 1. Severe storm forecasting 2. Severe storm forecast procedures.—Authors' abstract.*

12.2-240

551.521:551.509.323

†Myers, Vance A. (*U. S. W. B., Wash., D. C.*), **Application of radiation data to maximum temperature forecasting.** *Monthly Weather Review*, Wash., D. C., 86(5):149-164, May 1958. 17 figs., 10 tables, 20 refs., 9 eqs. DWB—A method is developed for evaluating the local heating and cooling by radiation and related processes, for predicting the daily maximum temperature at Nashville, Tenn. *Subject Headings: 1. Maximum temperature forecasting 2. Radiation data 3. Nashville, Tenn.—Author's abstract.*

12.2-241

551.509.323.2:551.524.37

Onikul, R. I., **Zamorozki na Sakhaline.** [Freezes on Sakhalin Island.] *Dal'nevostochnyi Nauchno-Issledovatel'skii Gidrometeorologicheskii Institut, Trudy*, No. 6, pub. Leningrad, 1958. p. 44-58. 3 figs., 5 tables, 5 refs. DWB—This study is concerned with the meteorological factors involved in the occurrence of freezes in the agricultural areas of Sakhalin which include the coastal and inland regions of southern and central Sakhalin. The topography and climate of these regions are described and with the aid of considerable data an analysis is presented of the local characteristics of the daily temperature variation, the synoptic situations associated with freezes, the meteorological conditions of freezes, including wind, cloud cover, precipitation, fog and soil moisture, relationship between freezes and atmospheric temperature and humidity. The construction and use of a graph for forecasting freezes is described. *Subject Headings: 1. Freezing forecasting 2. Climate of Sakhalin Island 3. Synoptic conditions for freezing 4. Sakhalin Island.—I.L.D.*

12.2-242

551.509.323.2

Serra, Adalberto, **Previsão da geada.** [Frost forecasting.] *Revista Brasileira de Geografia*, Rio de Janeiro, 19(4):421-444, Oct./Dec. 1957. numerous eqs. French, Spanish, English, German, and Portuguese summaries. DLC—Several different kinds of frost and the causes of their formation are discussed and mathematically explained. One of the most important causes for the formation of frost is night-time radiation which is discussed theoretically for both cases of clear and cloudy sky. Brunt's formula for forecasting night-time temperature decrease is developed. From this formula can be formulated the rules for forecasting frost. The influence of topography as well as the type of soil are also studied on the temperature. Through such a study rules can be devised for plant protection. At the end Young's formula is set forth and also the method for determining the local constants. *Subject Headings: 1. Frost forecasting 2. Frost formulas.—I.S.*

12.2-243

551.509.324.1

O'Connor, James F., **Cloud significance and forecasting.** issued 1954? 147 p. Mimeo. figs., photos. p. 140-147, Appleby, James F., **Trajectory method of making quantitative short-range forecast of differential advection, instability, and moisture.** 9 refs. (non after 1953), 11 charts. Bound in: Lederer, Jerome, **Some relationships between weather and air safety**, from *American Meteorological Society, Bulletin*, 34(8):339-350, Oct. 1953. (See 6.4-14.) DWB (M76 O18c1.)—Brief physics and behavior in relation to flight operation and forecasting of several cloud types are discussed. Pertinent nomograms, synoptic situations, reproductions of literature and professional methods, etc., are included. The cloud types discussed are: Cumulus (humilis, congestus, calvus), stratocumulus (vesperalis and cumulonimbus), stratus and fractostratus, inversion and gulf stratus, altostratus (translucidus and opacus), altocumulus (translucidus and opacus) and the cirrus types. *Subject Headings: 1. Cloud types 2. Cloud forecasting.—W.N.*

12.2-244

551.509.327:551.515.2:519.241

Malone, Thomas F. (*Travelers Insurance Co., Hartford, Conn.*) **A method for preparing probability forecasts applicable to decision-making when a hurricane threatens.** 1959(?).

4 p. 7 figs., 3 refs. Carbon of typescript. DWB (M15.2 M257me)—The application of Veigas-Miller method for deciding at what point the danger from a hurricane warrants the cost of precautionary measures is discussed. First, the decision criterion of THOMPSON is explained. Then, by analyzing 447-hurricane movements in the North Atlantic Ocean and the Gulf of Mexico, an attempt is made to develop a multiple linear regression equation for the purpose of prediction. Principal positions are graphically explained. *Subject Headings:* 1. Hurricane forecasting 2. Probability forecasts 3. Hurricane precautions 4. Regression equations.—I.S.

12.2-245

551.509.33 551.509.22

Seidel, G., Ein Beitrag zur Verbesserung der Methoden der kurz- und mittelfristigen Wettersvorhersage. [A contribution to the improvement of methods of short range and extended weather forecasts.] *Meteorologische Rundschau*, Berlin, 11(4):105-108, July/Aug. 1958. 12 figs., 2 tables, 3 refs. DWB, DLC—In a previous paper (see 12.2-214), the author established extended range forecasting rules on the basis of a relationship between variations of the Arctic cold air supply on the Western Hemisphere and the circulation over Europe during the winters of 1954-55 and 1955-56. The following magnitudes were defined: F =cold air amount of the entire Arctic, as a surface in square kilometers which is bounded by the isohypse 5000 gpm in the relative topography 500/1000 mb; F_w =sector of F bounded by the meridian 30°W and 170°W long; $F_w = F_w'10^\circ/F$ and V_E =mean zonal component of F the geostrophic wind in 500 mb level over Europe. The prognostic rule that a fall (rise) of F_w below (above) 40% is associated with the appearance of about 6 days later, a cyclonic (anticyclonic) development with high (low) values of U_g , was tested for eight years of winter data for the period 1949-1957 and was found to hold for the winters of 1954/55 and 1955/56. The extension of this rule to atmospheric temperature and precipitation is investigated with the aid of data for south and southwest Germany. With a rise of F_w subnormal temperature values occur between the 6th and 7th day after an initial above normal temperature; with a decline in F_w there is a transition from negative to positive temperature deviation between the 6th and 7th days. In the case of precipitation a rise of F_w is associated with a distance diminution of the number of rain days and precipitation amounts in north and south Germany; between the 6th and 7th days, while a fall in F_w is followed by an increase in the number of rain days and in amount of precipitation. *Subject Headings:* 1. Short range forecasting 2. Extended forecasting 3. Forecast improvement 4. Forecasting techniques.—I.L.D.

12.2-246

551.509.335:551.509.318

Ped', D. A. and Al'tverger, R. M., O prognoze tsirkulatsionnykh osobennostei makroprotsessov. [Forecasting circulation characteristics of large-scale processes.] *Moscow. Tsentral'nyi Institut Prognozov, Trudy*, No. 64:87-110, 1958. 13 figs., 7 tables, 19 refs., 12 eqs. DLC—The authors develop a method of employing analogs in order to forecast large scale weather processes 3-6 days in advance. The authors review the use of the analog in forecasting in combination with the natural synoptic periods of MUL'TANOVSKIĭ and the quantitative criteria proposed by N. BAGROV to determine analogousness of fields at individual points and for entire fields. The inadequacy of geometrical analogousness and the importance of thermohydrodynamics the degree of analogy in contiguous natural synoptic periods, the degree of analogy in adjacent natural synoptic periods, of which the initial ones were selected by taking into account morphological and genetic features for a given territory, etc. An attempt is made to take into account the influence of circulation conditions in the Northern Hemisphere in the formation of large scale processes over a particular area by using the circulation index in the analysis of the development of analogous processes. The procedure is described and an outline of steps in applying this method is presented. *Subject Headings:* 1. Analog forecasts 2. Large scale weather processes.—I.L.D.

12.2-247

551.509.5:061.3(52)

Kusano, Kazuo (ed.) (*Sendai District Met. Obs. Forecast Sec.*), A conference report of a day. *Meteorological Research Notes (Kisho Kenkyu Note)*, Tokyo, Japan, 9(2):89-100, June 1958. 25 figs., 17 refs. In Japanese (title Romanized: Aruhi no kaihökiroku). DWB—A conference report of the forecast section at Sendai Observatory, April 5, 1958. The weather

maps of April 3 and 4, 1958 are given. The comments on the analysis of meteorological conditions and the forecast of April 6, 1958 in the areas of Sendai and Akita, Japan, are presented. *Subject Headings:* 1. Forecasting services 2. Conference reports 3. Sendai Observatory, Japan.—J. H. Woo.

WEATHER CONTROL

12.2-248

551.509.615:551.575.1

Ramsey, M. A. (*Engineer, Worthington Corp.*), **Eliminating man-made fog.** *Air Conditioning, Heating and Ventilating*, N. Y., 55(12):55-58, Dec. 1958. 6 figs. DWB, DLC—Definite solution for eliminating or preventing fogs arising from human activities is demonstrated here by means of simple psychometric charts. Since the locus of any possible air-water mixture approximates the straight line between two points representing the condition of the mixtures on the chart, this mixture line, if within the area of the saturation curve, below 100 rh will indicate no fog, if to the left of the saturation curve for any part, the point on the locus in that region results in fog, and the thicker the farther out from the saturation curve. The illustrated examples applicable to swimming pools, shower rooms, industrial areas, skating rinks, cooling towers, evaporative condensers, etc. are not restricted. *Subject Heading:* 1. Fog prevention.—W.N.

12.2-249

551.509.615:621.43.06:629.135.2

Smith, Robert B. and Wexler, Raymond, **A test of the feasibility of the use of jet engine exhaust heat for fog dissipation.** Allied Research Associates, Inc., Boston, Contract AF 19(604)-3492 (Research directed toward contrail elimination), Final Report, Pt. I, March 31, 1959. 20 p. 10 figs. (incl. photos), 2 tables, 4 refs., eqs. DWB—Measurements of temperature and wind speed in the exhaust plume of a jet aircraft operating on the ground were made to investigate the feasibility of the use of jet engine exhaust heat to dissipate fog from airport runways. Bead thermister thermometers and anemometers, suspended from kytosons which were towed by trucks, were used to make the measurements. A field test in a calm showed that temperature rises of 2°F above ambient reached 200 ft above the runway over a width of 200 ft at distances of 300-600 ft behind the tail pipe. Maximum induced wind speeds in this region were about 20 mph. Based on the results of this experiment a fog dissipation technique for airport runways using jet exhaust heat seems feasible for fogs warmer than about 30°F. *Subject Headings:* 1. Fog dissipation by jet exhaust 2. Jet aircraft.—Authors' abstract.

12.2-250

551.509.615 551.509.616

Smith, Robert B.; Wexler, Raymond and Glaser, Arnold H., **Modification of fog and cloud particles in the atmosphere.** Allied Research Associates, Inc., Boston, Contract AF 19(604)-3492, Final Report, Pt. 2, March 31, 1959. 47 p. 6 figs., 8 tables, 7 refs., 23 eqs. DWB—Pt. 2 of the report deals with aspects of artificial fog and cloud modification. A number of studies and experiments on dry-ice crushing and disseminating equipment led to a suggested improved design. Analysis of 22 dry-ice seeding missions performed by the Air Force Cambridge Research Center showed significant correlations among maximum area of hole created in clouds, time to form maximum hole, weight of dry ice used, and length of seeding track. Tests of the possibility of the use of mortar projectiles for the dissemination of dry ice in supercooled fogs such as occur at Elmendorf AFB, Alaska, were encouraging. The possibility of the reduction or suppression of fogs by the use of hexadecanol to prevent evaporation from nearby free water surfaces is discussed. Evaporation of some fog and small clouds through the absorption of sunlight by pollutants added to the cloud seems possible on the basis of calculations of the effect of carbon black seeding, as well as more general theoretical considerations. *Subject Headings:* 1. Artificial cloud modification 2. Fog dissipation.—Authors' abstract.

12.2-251

551.509.616:061.3

†U. S. Congress. House. Committee on Interstate and Foreign Commerce, **Weather modification research.** Hearings before a subcommittee of the Committee on Interstate and Foreign Commerce, House of Representatives, 85th Congress, 2nd Session, on S.86, an act to provide for a research program . . . March 18 and 19, 1958. Washington, D. C., U. S.

Govt. Print. Off., 1958. 107 p. Bibliography on weather modification, p. 98-107. DWB (M09.67 U583we) -The present status of weather modification is depicted in considerable detail in statements, papers and replies to questioning by such witnesses as F. W. REICHELDERFER (U. S. Weather Bureau), HOWARD T. ORVILLE (formerly Advisory Commission on Weather Control), B. VONNEGUT, (scientist), B. QUATE, J. L. DI SANTO (commercial cloud seeders), and others. *Subject Headings:* 1. Congressional hearings on cloud modification 2. Weather modification 3. Weather modification bibliographies.—G.T.

12.2-252

551.574.1 551.509.616:546.57:546.15

Vonnegut, Bernard, **Early work on silver iodide smokes for cloud seeding.** (In: U. S. Advisory Committee on Weather Control, **Final Report, 1957.** 2:285-283.) DWB, DLC -The early work on the use of silver iodide for seeding clouds in the natural atmosphere involved the development of AgI generators and the evaluation of the nuclei output of the various generators. The various methods of making and dispersing AgI described by the author are: production of small AgI particles by mechanical agitation; vaporization of AgI at high temperature and rapidly condensing the vapor at very small particles; using fire works filled with AgI; use of a generator consisting of a hot gas flame into which a string coated with AgI was fed; generators converting solutions of AgI dissolved as a complex with other silver iodides; involving combustion of various solid fuels impregnated with AgI; ignition of pieces of charcoal impregnated with AgI and dropping from an airplane; atomizing of a hot solution of AgI in an acetone flame. Two techniques for evaluation rate of nuclei output by AgI generators are described; namely, operating the generator at the entrance to a wind tunnel so that the entire output is mixed with clean air; withdrawing samples of air containing AgI and testing it at various temperatures in the cold box and measuring the output of a generator which operated in a large room or building, and testing samples in a cold box. *Subject Headings:* 1. Cloud seeding with silver iodide 2. Silver iodide smoke generators.—I.L.D.

11.2-253

551.578.7:551.509.616:546.57:546.15

Weather Engineers, Inc., Sacramento, Calif., **Hail suppression operations in the North Platte Valley of Nebraska—in the air, and on the ground, 1957 season.** pub. 1957. 27 p. 8 figs., 4 tables, 10 refs. Mimeo.—Preliminary results of hail suppression operations conducted in the North Platte Valley in 1957, by means of ground-based silver iodide generators and four aircraft carrying AgI generators, are reported. The evaluation was done on the basis of a correlation found between total precipitation and hail damage in that area. Hail damage in 1957 was found to be considerably below the amounts to be expected from that correlation. In terms of economic value this is claimed to represent a return of 90 to 1 on the investment in hail suppression operations. *Subject Headings:* 1. Hail suppression 2. Cloud seeding with silver iodide 3. North Platte Valley, Nebr.—G.T.

12.2-254

551.509.617:546.33

Augustin, Henri (*Service Météorologique de Madagascar*), **Les recherches du Service Météorologique de Madagascar dans le domaine de la pluie provoquée de 1953 à 1956.** [Research by the Meteorological Service of Madagascar in the field of artificial precipitation from 1953 to 1956.] (In: Angola. Serviço Meteorológico, *Miscelanea geofísica.* Luanda, 1956. p. 194-205. 3 figs., 2 tables, 3 refs. DWB (M(08) A592mi)—Visual and rain gage observations made during 101 days of cloud seeding experiments made on Madagascar by means of salt dispensed from aircraft are analyzed. The experiments, conducted in order to alleviate the disastrous local drought, are found to have produced some interesting results. It is not believed, however, that they could be expected to produce climatic changes of any importance. *Subject Headings:* 1. Cloud seeding experiments 2. Cloud seeding with salt 3. Madagascar.—*Transl. of author's abstract.*

12.2-255

551.509.617:551.578.7(45)

De Rossi, Fernando, **Sulla semina delle nubi con nuclei igroscopici giganti e gli esperimenti di difesa antigrandine effettuati nell'Italia settentrionale.** [Cloud seeding with large hygroscopic nuclei and experiments on hail prevention in northern Italy.] *Geofisica e Meteorologia*, Genoa, 7(3/4):82-83, May/Aug. 1959. 2 refs. Italian and English summaries p. 83. DWB—

Irrespective of the validity of LUDLAM's theory on the formation of hail, which is not discussed in this article, it is pointed out that results, if any, of hail defense effected in Italy from 1949 to 1958 cannot be considered as supporting LUDLAM's views. Moreover, said theory invalidates such results. *Subject Headings:* 1. Cloud seeding with salt 2. Hail prevention 3. Italy. —*Author's summary.*

12.2-256

551.509.617(529)

*Rain Stimulation Research Institute, Taipei, Taiwan, China, **Third report on cloud-seeding experiments over Sun-Moon Lake area, 1954-1956.** Issued August 1958. 11 p. 2 figs., 11 tables. **DWB**—This is the third in a series of reports concerning cloud-seeding experiments in Taiwan, just initiated in 1951. The period covered in this report is the dry seasons during 1954-55 and 1955-56. The times of operation, the weather summary, and the evaluation of the 1954-56 seeding activities are presented. It is concluded that during the five dry seasons 1951-52 to 1955-56, the average increase in rainfall over the target area is 23% and the probability of this increase having resulted from the seeding activities is 77%. *Subject Headings:* 1. Cloud seeding experiments 2. Taiwan, China.—*I.S.*

12.2-257

551.509.617 551.509.61:061.1(47)

Shtal', V. A. and Morachevskii, V. G., **Aktivnoe vozdeistvie na pogodu.** [A method for acting upon the weather.] *Priroda*, Moscow, No. 9:85-88, Sept. 1958. 5 figs. **DLC**—An Institute for Artificial Rain was established in the U.S.S.R. in 1931 in the People's Commissariat for Agriculture. Subsequently it was transferred to the Leningrad Institute of Experimental Meteorology. The problem of weather modification is being investigated also by the Principal Geophysical Observatory, the Central Aerological Observatory, etc. In 1949 B. IA. NIKANDROV produced artificial rain in 11 out of 15 attempts with cumulus and strato-cumulus clouds. The mode of action of dry ice and AgI seeding of clouds, results of experiments carried out in Japan and Madagascar and the opinions of American meteorologists on the effectiveness of cloud seeding are summarized. The seeding of low clouds and fog to improve visibility over airports by means of dry ice, AgI, etc. from airplanes and the process of cloud or fog dispersion are described with the aid of photographs. Dry ice proved effective at an air temperature of -5°C and wind velocity not exceeding 8-10 m/sec. At larger wind speeds only holes were formed in the clouds and a stable zone of clearing was not produced. The use of cloud shooting in hail prevention and the dissipation of thunderstorm clouds to prevent thunderstorms are discussed. *Subject Headings:* 1. Progress in weather control 2. Artificial cloud modification.—*I.L.D.*

ATMOSPHERIC STRUCTURE AND PHYSICS

ATMOSPHERIC COMPOSITION

See: Upper air chem. (Miller), 12.2-3; *Atmos. chem.* (Cadle, Magill), 12.2-259.

ATMOSPHERIC POLLUTION

See also: Atmos. pollution effects on visibility (Holzworth), 12.2-34; *Atmos. pollution from nuclear explosions* (Rougeron), 12.2-73; *Spread of radioactive aerosols* (Flohn), 12.2-74; *Aerosol radioactivity determination* (Klumb, Dahlen), 12.2-75; *Volcanic dust*, Kivu District (Du Bois), 12.2-141; *Dust collecting techniques* (Lunde, Lapple), 12.2-196; *Particle size determination* (Challande, David), 12.2-221; *Atmos. pollution studies* (Gruber, Jutze), 12.2-222; *Dust measurement* (Steinhauser), 12.2-224; *Particle size distribution measurement* (O'Konski et al.), 12.2-226; *Diffusion of gases* (Record, Cramer), 12.2-346; *Diffusion of gases* (Diem, Trappenberg), 12.2-348; *Atmos. pollution test chambers* (Thuman, Cadle), 12.2-385; *Met. of Los Angeles air pollution* (Edinger), 12.2-406.

12.2-258

551.510.42

Brown, R. L.; Hawksley, P. G. and Horspool, J. M., **Facts about air pollution.** *Smokeless Air*, London, 29(110):273-279, 1959. table, 9 refs. **DLC**—A quantitative analysis of the origin of air pollutants was given at a meeting of the Institution of Public Engineers in London on May 14, 1958. The British Coal Utilization Research Association concluded that the

estimated industrial smoke has reduced from 800,000 tons yearly to 100,000 tons but the estimated weight of domestic smoke remains at 900,000 tons. Means of minimizing dust and grit pollution from factories as well as sulphur pollution from homes and factories are presented. At the moment no economically feasible method of removing the sulphurous constituents from industrial or domestic flue gases has been devised, although methods have been developed for flue gas washing at power stations. *Subject Heading: 1. Atmospheric pollution.—N.N.*

12.2-259

551.510.41:551.510.522 551.510.42

†Cadle, R. D. and Magill, P. L., **Chemistry of contaminated atmospheres.** (In: Magill, Paul L. et al. (eds.), *Air pollution handbook*. N. Y. McGraw-Hill, 1956. Section 3 (27 p.). 9 tables, 72 refs., 45 eqs.) **DWB** (M10.42 M194), **DLC** (TD883.M35)—This section is devoted to a discussion of the chemistry of contaminated atmosphere and also the chemistry of the natural atmosphere as it is related to air pollution problems. The emphasis is placed on the chemistry of the troposphere, the layer of air in which man lives. The presentation shows a systematic organization. First, a chemical analysis of the composition of the natural atmosphere is presented. Then the discussion turns to air contaminants. Aerosols and gaseous impurities are separately discussed. Finally, a study is made of a variety of chemical reactions which may occur in the contaminated atmosphere of cities. This portion of the discussion is based in part on a study of the Los Angeles smog chemical reactions made by CADLE and JOHNSTON. *Subject Headings: 1. Atmospheric chemistry 2. Troposphere 3. Atmospheric pollution.—I.S.*

12.2-260

551.551:551.510.42

*†Gosline, C. A.; Falk, L. L. and Helmers, E. N., **Evaluation of weather effects.** (In: Magill, Paul L. et al. (eds.), *Air pollution handbook*. N. Y. McGraw-Hill, 1956. Section 5 (66 p.). 27 figs., 15 tables, 102 refs., 47 eqs.) **DWB** (M10.42 M194), **DLC** (TD883.M35)—This section presents a detailed and systematic study of weather effects on atmospheric pollution problems. It considers methods for judging the rate of dispersion and its consequences upon the territory exposed. The text is extensively illustrated by graphs, tables and photographs. First, the basic concepts of meteorology, essential for an air pollution engineer, are described, and the sources of weather information and meteorological services are indicated. Then, a detailed survey is made of atmospheric diffusion and its estimation. The last parts of the discussion consider planning and interpretation of air pollution surveys, plan-site selection, and meteorological control of potential atmospheric pollutants. *Subject Headings: 1. Atmospheric pollution 2. Dispersion of contaminants.—I.S.*

12.2-261

551.510.41 551.510.42:628.53

Haagen-Smit, A. J. (*Calif. Inst. of Technology*), **Air conservation: with discovery of the sources and chemical reactions of pollutants, the stage is set for conservation.** *Science*, N. Y., 128(3329):869-878, Oct. 17, 1958. 11 figs. (incl. photos), table, 11 refs. **DLC**—Air pollution problems are considered and profusely illustrated by graphs and photographs. A detailed chemical analysis of two types of air pollution is offered. The first caused by smoke is an old problem and exists in every great city. The problem of controlling the emission of smoke is discussed and its complexity indicated. The specific air pollution problem cannot be dealt with adequately without cooperative assistance of many scientific and technical disciplines. The second type of air pollution, Los Angeles smog, is more serious and threatens to affect all metropolitan areas. It is found to be an oxidation phenomena of organic material. The chemical analysis indicates that to effectively control this type of air pollution, it is needed to control hydrocarbons, their oxidation products, and the oxides of nitrogen. Their major source, aside from refineries, is the exhaust of automobiles. In the end pollution levels and control measures are discussed. *Subject Headings: 1. Atmospheric pollution control studies 2. Chemical composition of atmosphere.—I.S.*

12.2-262

551.510.42:628.53:546.86

Haines, George F., Jr.; Hemeon, Wesley, C. L. and Cember, Herman (all, *Hemeon Assoc. Pitts., Pa.*), **Method for tracing the ground-level distribution of stack gas emissions.** *Air Pollution Control Association, Proceedings*, Vol. 50, 1957, issued 1958? Paper No. 10 (5 p.).

5 figs., table, 7 refs. (For abstract on this title from another source, see 10.2-159.) **DWB** (M10.42 A298ap)—A new method has been described whereby the stream of gases from a particular stack can be tagged by addition of small quantities of antimony oxide powder as a tracer substance. Automatic air samplers operating simultaneously in the surrounding territory will pick up the tracer in inverse proportion to the dilution experienced by the stack gases. Quantitative recognition of the tracer powder in amounts as small as $0.01\mu\text{g}$. is effected by a simple laboratory procedure involving neutron activation analysis. *Subject Headings:*

1. Stack effluents 2. Tracer techniques.—*Authors' summary.*

12.2-263

551.510.42:551.591.31

Jáuregui O., Ernesto, **El aumento de la turbiedad del aire en la Ciudad de México.** [Increase of air pollution in Mexico City.] *Ingeniería Hidráulica en México*, Mexico City, 12(4):9-18, Oct./Dec. 1958. 3 figs., photos, 6 refs. English summary, yellow summary section, p. 1. **DWB**—Since the population of Mexico City has more than doubled (1,775,000 to >4,000,000) between 1940 and 1957, the amount of atmosphere pollution and reduced visibility has become serious as shown in photos of the city looking in each of four directions and data tables and graphs. The pollution is not, as some suppose, dirt and dust borne by the wind as it is present at all times and more in the calm morning hours. When the wind is E to S the pollution is much less. Comparison is made with conditions in other countries. Diurnal visibility (to NE) from Tacubaya 1935-39 and 1950-54 are shown comparatively for spring and winter. Reduction has been from a mean (at 15-17h) of 9 km to 2 km. Also the year-to-year averages for dry and wet season for period 1936-1957 shows downward trend. *Subject Headings:*

1. Atmospheric pollution effects on visibility 2. Daytime visibility 3. Tacubaya, Mexico City, Mexico.—*M.R.*

12.2-264

551.510.42:711.4

*†Katz, Morris, **City planning, industrial-plant location, and air pollution.** (In: Magill, Paul L. et al. (eds.), *Air pollution handbook*. N. Y. McGraw-Hill, 1956. Section 2 (53 p.). 12 tables, 68 refs.) **DWB** (M10.42 M194), **DLC** (TD883.M35)—This section deals with such questions as city planning, industrial-plant location, and zoning. A number of case histories are analyzed to show the success or failure of certain abatement efforts. The discussion also takes into consideration the organization and functions of air pollution control groups, and the relation between nature, extent, and distribution of contaminants as revealed by air pollution surveys and the measures necessary to reduce or control pollution. Of special interest is part 7 which discusses the influence of meteorological factors on dilution, dispersion, and control of effluents. *Subject Headings:* **1. Atmospheric pollution 2. City planning.**—*I.S.*

12.2-265

551.510.42:621.43.06:629.113

Nedogibchenko, M. K., **Sovremennoe sostoiانيا zagriazneniia atmosfernogo vozdukha gorodov vykhlopnymi gazami avtotransporta i zadachi po bor'be s nim.** [The current state of atmospheric air pollution by automobile exhaust gases in cities and problems of its control.] *Gigiena i Sanitariia*, Moscow, 23(8):6-9, Aug. 1958. **DLC**—The exhaust gases of automobiles include carbon monoxide (CO), soot, tar, carcinogenic substance 3-4, benzpyrene, nitrogen oxides and lead compounds. In some cities the concentration of CO in the streets exceeds the maximum allowable; concentrations of 100-200 mg/m³; and 128 mg/m³ have been attained in Moscow and Leningrad for example. The exhaust gases, in particular CO, are not restricted to the street itself but are found in considerable concentration at a height of four stories. Various numerical values on the concentration of CO gas at various distances from automobiles, the amounts of CO produced by various types of Soviet automobiles, the permissible concentration of CO in the atmosphere (a maximum of 6 mg/m³ in single samples and 2 mg/m³ in mean daily samples), etc., are presented. The results of studies on the concentration of atmospheric pollutants carried out in 1956 in Moscow, Riga, Sverdlovsk, Ivanovo and Perm are summarized. In Sverdlovsk the lead content of automobile exhaust gases ranged from 0.069 to 3.7 gm/m³; the maximum permissible concentration of 0.0007 mg/m³ was exceeded in the streets. Means for controlling the amount of and nature of automobile exhaust gases are discussed. *Subject Headings:* **1. Automobile exhaust pollution 2. Atmospheric pollution control 3. U.S.S.R.**—*I.L.D.*

12.2-266

551.510.42

Rossano, August T., Jr. and Schell, Norman E. (both, *R. A. Taft Sanitary Engineering Center, Cincinnati, Ohio*), **Procedures for making an inventory of air pollution emissions.** *Air Pollution Control Association, Journal*, 8(2):147-152, Aug. 1958. 7 figs., table, eqs. DLC. Also issued as: *Air Pollution Control Association, Proceedings*, Vol. 50, 1957. Issued 1958? Paper No. 3 (7 p.). 8 figs., table, 8 refs. DWB (M10.42 A298ap)—In summary, it is again emphasized that the approach employed in making an emission inventory is a function of the particular air pollution problem under investigation. A reasonably accurate estimate of emissions from multiple sources such as transportation, heat and power production and waste incineration can be made on the basis of such available figures as quantities of fuel and wastes burned in conjunction with knowledge of products of combustion. In the case of specific source studies, although standard procedures have been established for some types of sampling, modifications are often necessary. While the few examples mentioned here will by no means suffice for specific sampling problems which are bound to occur, they may serve as a guide in developing the appropriate approach. *Subject Headings: 1. Atmospheric pollution emissions 2. Air sampling and analysis.—Authors' abstract.*

12.2-267

551.584.5:551.510.42

Scott, William E. (*Franklin Inst. Lab. for Res. & Develop., Philadelphia*), **Identifying and measuring pollutants in community atmosphere.** (In: National Conference on Air Pollution, Wash., D. C., Nov. 1958, *Proceedings*, pub. 1959. p. 84-86.) DWB (M10.42 N277pr)—It is very easy to develop methods for identification and quantitative analysis for materials which are present in the atmosphere or at least known to be present. It is only a question then of getting methods that are sufficiently sensitive. In the case of the complex situation having a known reaction product, however, this task becomes difficult. Efforts are being made at Franklin Institute Laboratories in Philadelphia to experiment with different methods which might solve this problem. It is made sure that the method is sensitive, provides irrefutable identification of the pollutants in the atmosphere and that it is a quantitative method. The two methods so far adopted are Longpath infrared technique and the technique of gas chromatography. Both methods have their advantages and limitations and none is foolproof. It is interesting to note that the efforts to identify all the different reactions in the Los Angeles atmosphere have not met absolute success. The great need is to further refine these methods. When a sure method that can serve as reference is developed, only then can be developed simpler and less expensive analytical methods. *Subject Headings: 1. Air sampling and analysis 2. Atmospheric pollutant identification 3. Urban atmospheres.—I.S.*

12.2-268

551.510.42:551.584.5 (794)

Weaver, E. R.; Hughes, E. E. et al. (all, *Natl. Bur. of Stands., Wash., D. C.*), **Interpretation of mass spectra of condensates from urban atmospheres.** *Air Pollution Control Association, Proceedings*, Vol. 50, 1957. Issued 1958? Paper No. 24 (11 p.). 16 figs., 2 tables, 3 refs DWB (M10.42 A298ap)—Significant sources of pollutants in the Los Angeles area are tabulated and discussed. The analytical and graphical presentation of investigations shows the characteristic pattern for each source of pollutant. The paper shows the procedure for making the necessary estimates of the polluting gases in each urban atmosphere. *Subject Headings: 1. Atmospheric pollution 2. Urban atmospheres.—N.N.*

TROPOSPHERE—STRATOSPHERE

See also: **Trop. radio wave propagation** (Gough), 12.2-89; **Trop. radio wave propagation** (Isted), 12.2-90; **Stratospheric composition** (Challande, David), 12.2-221; **Sodium in twilight** (Donahue), 12.2-421.

12.2-269

551.510.528

Borbély, Edit, **A tropopauza típusai és meghatározásuk.** [Types of the tropopause and their determination.] *Időjárás*, Budapest, 62(2):110-112, March/April 1958. fig. Also: Béll, Béla, **Grafikus segédeszköz a tropopauza meghatározására.** [A graphical aid for the determination of the tropopause.] *Ibid.*, 62(2):113-115, March/April 1958. 5 figs. DWB,

DLC—Various methods of defining and determining the troposphere, and suggestions of the WMO Commission for Aerology aimed at international uniformity in tropopause determination are reviewed. The use of linagrams for locating the tropopause according to the WMO definition is discussed. *Subject Heading: 1. Tropopause types.*—G.T.

12.2-270

551.510.528

Grober, K. W., *Zur Frage der Tropopausentypen*. [Question of tropopause types.] *Zeitschrift für Meteorologie*, Berlin, 11(5/6):177-182, May/June 1957. fig., 6 tables, 7 refs. **DWB, DLC**—The history of the classification of the tropopause into types beginning with the work of SCHNAUSS, up to the present, is reviewed. An examination of the various data on tropopause types indicates that no strict relationship exists between troposphere type on the one hand and weather situation, barometric pressure at the earth's surface, pressure changes within the troposphere and the dynamics of the troposphere on the other. The author establishes five troposphere types which are defined strictly on the basis of temperature gradients. These defined types are compared with those proposed by various authors and illustrated in a diagram. Extensive data are presented on the following: temperature distribution over Greifswald, 3 km below to 2 km above the tropopause, temperature gradients below and above the tropopause (over Greifswald and according to E. PALMEN), annual variation of pressure surfaces or relative topographies as a function of variation in tropopause height, variation of tropopause height in individual tropopause types within 24 hours, frequency of individual tropopause types and six year means (1950-1955) of tropopause values at Greifswald. *Subject Heading: 1. Tropopause types.*—I.L.D.

12.2-271

551.510.528(52)

Ooi, S. (*Aerological Section, Japan. Met. Agency*), **Altitude of tropopause at Tateno Observatory**. *Tateno, Japan. Aerological Observatory, Journal*, 6(2):77-79, Feb. 1958. 2 figs., table, 2 refs. In Japanese; English summary p. 77. **DLC**—Distribution and mean of altitude of tropopause at Tateno Observatory in 1955 are examined. Definition of tropopause used is shown in the Bulletin of the Aerological Observatory, Tateno. Tropopause are classified into two groups, equatorial and polar. Their distribution is shown in Fig. 1. Seasonal variation of their means are shown in Table 1 and Fig. 2. *Subject Headings: 1. Tropopause height frequency distribution 2. Tateno, Japan.*—*Author's summary.*

12.272

551.509.318:551.510.528:551.558.2

§†Pallmann, Albert, **Über spontanes Absinken der Tropopause**. [Spontaneous lowering of the tropopause.] *Cologne. Universität. Meteorologisches Institut, Veröffentlichungen*, No. 4, 1958. 102 p. 64 figs., 69 refs., eqs. **DWB (M(055) C718ve)**—The correlation between vertical air-mass movement and the simultaneous lowering of the tropopause is the subject of this elaborate hydro-dynamic study of a weather system over Central Europe and its development of cold air drops with lowering and subsequent rise of the tropopause of December 31, 1954. The synoptic situation is described. A formula is developed which permits calculation of the horizontal distribution of the vertical velocity w to 200 mb within a 3-D screen composed of 150 measuring points at six different elevations. A deepening of the tropopause may be expected right where a maximum lowering velocity is pre-indicated. The quantitative investigation into the correlation between air-mass displacement and the tropopause lowering showed departures of the vertical velocity at 20 to 30% plus or minus, indicating no exact substantiality of the tropopause. A plausible explanation of the mechanism of the lowering is offered. *Subject Headings: 1. Tropopause height variations 2. Vertical motion—tropopause correlations 3. Synoptic conditions for tropopause lowering.*—W.N.

12.2-273

551.510.528:551.515.8

Reed, Richard J., **Discontinuity surfaces in the boundary region between troposphere and stratosphere**. Washington (State). Univ. Dept. of Meteorology and Climatology, Contract AF 19(604)-1811, Occasional Report No. 8, Jan. 1958. 21 p. 3 refs. Bound with this: Reed, Richard J. and Danielsen, Edwin F.: **Fronts in the vicinity of the tropopause**, p. 6-21. 11 figs., 20 refs., eq. (for abstract from another source, see 10.10-243). **DWB**. Transl. into English in the corresponding number of the *Akademiia Nauk SSSR, Geophysics Series*. **DLC**—

The research under report is aimed at answering several important questions: 1) how continuous is the tropopause in space and time and what are the physical processes responsible for its formation and dissolution? 2) in regions of indefinite tropopause what discontinuity surfaces, if any, are present? 3) what is the relationship between the jet stream and tropopause? In an attempt to answer these questions a detailed synoptic analysis of tropopause structure and behavior during a 15-day period from 26 March to 10 April 1956 has been undertaken. Twice-daily constant pressure charts at all standard levels, seven standard vertical cross sections and isentropic charts of the 300A and 320A surfaces are being utilized in the study. Potential vorticities are being computed on the isentropic surfaces as a means of tracing air masses and detecting the appearance and disappearance of discontinuities. Problems connected with the preparation of the various charts are discussed. Brief mention is made of some tentative results. The second article is based on a study of five cases of pronounced fronts in the upper troposphere. It is concluded that the "waterspout" model offers the most satisfactory solution to the problem of connecting frontal boundaries and tropopauses. Composite cross sections of temperature, potential temperature, normal wind component and potential vorticity are presented for the five cases. On the basis of the potential vorticity measurements it is suggested that the most likely explanation for the formation of the high level front is a folding of the tropopause. *Subject Headings: 1. Tropopause discontinuities 2. Tropopause charts.—Authors' abstract.*

12.2-274

551.510.528:551.557

Schneider-Carius, Karl and Faust, Heinrich, *Energieakkumulation in Grundsicht und Nullschicht*. [Energy accumulation in the ground layer and zero layer.] *Geofisica Pura e Applicata*, Milan, 33:245-250, 1956. table, 15 refs., eqs. English and German summaries p. 245. **DLC**—The author discusses the meteorological properties of the zero and ground layers, and of the intermediate transition layer with special reference to the air movements and to the contrasting properties of these layers and points out that although the ground layer is at the "opposite pole" from the zero layer nevertheless may contain a narrow zone where a relative wind maximum is observable during hypergeostrophic wind velocities. *Subject Heading: 1. Zero layer.—I.L.D.*

12.2-275

551.507.362.1:541.14:551.510.53

†Kaplan, Joseph and Barth, Charles A. (both, UCLA), *Chemical aeronomy*. *National Academy of Sciences, Washington, D. C., Proceedings*, 44(2):105-112, Feb. 1958. 3 figs., 30 refs., 11 eqs. **DLC**—The character of the earth's atmosphere is due mainly to the influence of the solar radiation on the gases held by the gravitational attraction of the earth. To understand this influence, the authors first briefly review the spectral distribution of the sun's radiation and its effect on the physical properties of the earth's atmosphere. Chemical aeronomy, or the study of the chemical reactions taking place in the upper atmosphere, are then discussed, together with the role it plays in producing the night airglow. Finally, the technique of using chemical reactions to determine physical properties of the upper atmosphere, using rockets, is introduced. *Subject Headings: 1. Photochemistry of upper atmosphere 2. Solar-terrestrial relationships 3. Rocket measurement techniques.—Authors' introduction.*

12.2-276

551.510.53

†Nicolet, Marcel, *A general description of the earth's atmosphere*. Pennsylvania. State Univ. Ionosphere Research Laboratory, Contract AF 19(604)-1304, Scientific Report No. 97, Oct. 1957. 75 p. 4 tables, 61 refs., eqs. **DWB**—Before studying the specific aeronomic problems involved in a description of the earth's atmosphere, a general survey is made of various observations and theoretical possibilities. The basic problem of the composition of the homosphere is studied. For this purpose, a general description of the behavior of minor constituents and isotopes is made in order to correlate the various phenomena. The nature of the inter-relation between pressure, density and temperature is obtained for practical studies. It is shown that vertical transport by diffusion is of importance over the entire thermosphere. Finally, this report considers the influence of thermal conduction on the temperature distribution and the effects of this parameter are indicated. This work is to be followed by two reports concerned with the neutral and ionized regions of the upper atmos-

phere. It is to be considered as an introduction to these following reports. *Subject Headings:*

1. Homosphere 2. Atmospheric composition.—*Author's abstract.*

11.2-277

551.510.53:551.513.2:551.557.5

†Teweles, Sidney (U. S. W. B., Wash., D. C.), **Anomalous warming of the stratosphere over North America in early 1957.** *Monthly Weather Review*, Wash., D. C., 86(10):377-396, Oct. 1958. 25 figs., 32 refs. DWB, DLC—The anomalous stratospheric warming of January and February 1957 is studied in detail by means of constant pressure charts, time sections, and cross sections. The warming occurred as the meandering Arctic stratospheric jet stream of wave number two developed into a pair of vortices extending to above the 10 mb surface. It is concluded that development of stratospheric waves in the Northern Hemisphere is facilitated by autumnal growth of a forced perturbation locked in place by a warm ridge over the Aleutian area. The baroclinicity and rate of development were in agreement with FLEAGLE's criteria for the growth of disturbances. Interaction between the tropospheric jet stream and Arctic stratospheric jet stream during the period of development is believed responsible for the great intensity of the 1957 warming. *Subject Headings:* **1. Stratospheric warming 2. Tropospheric jet stream 3. Arctic stratospheric jet stream 4. North America,**—*Author's abstract.*

MECHANICS AND THERMODYNAMICS OF THE ATMOSPHERE

See also: Heat balance of earth's surface, 12.2-25; Eddy size distribution, O'Neill (Longley), 12.2-295; Anticyclone-humidity relationships (Maksić), 12.2-374; Drop stability (Krasikov, Chikirova), 12.2-380; Precip. physics (Volevakh), 12.2-386; Horizontal convergence (Gangopadhyaya, George), 12.2-389; Convective rainfall (Fujiwara), 12.2-393.

12.2-278

532.5:551.511

Bel, N. (*Inst. d'Astrophysique de Paris*), **Sur la classification des oscillations de deux fluides superposés.** [The classification of the oscillations of two superposed fluids.] *Annales d'Astrophysique*, Paris, 22(6):748-758, 1959. 6 figs., table, eqs. French, English and Russian summaries. DWB, DLC—The author studies the stability of oscillations of the interface in a composite atmosphere. For waves in propagation, parallel to this interface, and in the case of a dense fluid topped by another one less dense, there is a limiting wave length, depending upon the ratio of the densities of the two fluids, above which the perturbations cannot be propagated. The perturbations of short wave lengths which are propagated, are stable. When the top fluid is the more dense, there is always at least one nonstable mode of perturbation. *Subject Headings:* **1. Theoretical hydromechanics 2. Fluid mechanics 3. Perturbation equations.**—*Author's abstract.*

12.2-279

551.511:551.524:551.551.8

Businger, J. A., **Similarity and dissimilarity between turbulent transfer of heat and momentum near earth's surface.** Wisconsin. Univ. Dept. of Meteorology, Contract AF 19(604)-1384, Final Report, Aug. 31, 1958. p. 26-44. 17 refs., 32 eqs. DWB—The question whether the coefficients of turbulent transfer for momentum and heat are equal or not under various stability conditions is by no means settled yet. Experimental evidence that they are not equal is accumulating more rapidly than the evidence that they are equal. Theoretical approaches to the problem show a preference for the equality of the coefficients except for the theoretical arguments presented by PRIESTLEY and SWINBANK, which have never been widely accepted because they introduce a special kind of Maxwell demon. In the present paper it is shown that if similarity is maintained in the turbulent transfer of various properties on an ideal basis, the averaging process over extended periods may introduce differences in the coefficients of turbulent transfer. *Subject Headings:* **1. Turbulent transfer of heat 2. Turbulent transfer of momentum.**—*From author's abstract.*

12.2-280

551.511:551.543:551.576

Kagan, R. L., **Vliianie kondensatsionnykh pritokov tepla na izmenenie davleniia vo vremeni.** [Influence of condensation heat influx on pressure change with time.] *Meteoro-*

logiia i Gidrologiia, Leningrad, No. 2:7-14, Feb. 1959. fig., table, 6 refs., 13 eqs. **DWB, DLC**—When clouds of considerable thickness are present in the atmosphere there occur intense processes of phase transformations accompanied by the release and absorption of heat. Also radiation absorption is more intense than in a cloudless sky. This condensational advection of heat influences atmospheric pressure. From an equation of heat advection, the author obtains an approximate equation for heat advection in clouds in the lower troposphere and with temperatures that are not too low. The equation for determining the geopotential tendency is obtained and its solution is illustrated. The results of computations of heat advection are presented in a table and their effects on changes in the geopotential of isobaric surfaces are summarized. *Subject Headings*: 1. Advection effects on pressure 2. Pressure changes 3. Advection of heat in clouds.—*I.L.D.*

12.2-281

551.511:551.515.11:551.551:551.554

Lowell, Sherman C., **Shear waves in stratified rotating liquids**. New York. Univ. Institute of Mathematical Sciences, Contract AF 19(604)-2265, [Report] IMM-NYU 251, July 1958. 27 p. 3 tables, 9 refs., eqs. **DWB** (M09.327 N537sh)—The successful duplication of the hemispheric cyclonic pattern by means of a laboratory scale model of the atmosphere is the controlled rotation of liquids in cylinders. Different temperature of the liquids in the cylinders, the colder nearer the axis, causes the heat transfer to create a thermal wind which produces a continuous wind shear and vorticity change in vertical direction. Deepening and filling of cyclonic systems, relative wave speed and amplitude, etc. are simulated by this baroclinic scale model. Some peculiar wave forms finally degenerating into turbulence were observed and the phenomenon is treated here mathematically. *Subject Headings*: 1. Atmospheric circulation models 2. Rotating cylinder experiments 3. Baroclinic models.—*W.N.*

12.2-282

551.511:551.551

Ohji, Michio, **On the theory of homogeneous axisymmetric turbulence**. *Fukuoka, Japan. Kyushu Univ. Research Institute for Applied Mechanics, Reports*, 6(22):63-83, 1958. 2 figs., 6 refs., numerous eqs.—This paper intends to display the formulation of the spectrum of homogeneous axisymmetric turbulence in particular. The explicit representation of the second- and third-order wave-number tensors together with the governing dynamical equations are shown. And further, defining the special types of axisymmetric turbulence, that is, quasi-isotropic, axial and transverse turbulence respectively, we shall see how to interpret the general axisymmetric one as a composition of these elementary fields of motion. Incidentally, Batchelor-Chandrasekhar's formulation of axisymmetric correlation tensors is quoted with some notes. *Subject Headings*: 1. Axisymmetric turbulence 2. Turbulence spectrum.—*Author's abstract.*

12.2-283

551.511:551.3

Sasaki, Yoshikazu, **Method for solving the modified primitive equations**. Texas. Agricultural and Mechanical College, Dept. of Oceanography and Meteorology, Contract AF 19(604)-222, Scientific Report No. 4; Contract AF 19(604)-1565, Scientific Report No. 2, Oct. 1958. 9 p. fig., ref., 39 eqs. **DWB**—A method is proposed for solving the modified primitive equations of motion, continuity, and thermodynamics. New potentials are defined in order to simplify the introduction of boundary conditions. The second order derivatives of these potentials are the components of velocity. A convenient technique for obtaining the solutions is used in order to minimize errors, and to avoid certain computational instability. The latter arises from the advection terms, and when the oscillation is faster than the internal gravity wave. *Subject Heading*: 1. Equations of motion.—*Author's abstract.*

12.2-284

551.511.1

House, Donald C. (*U. S. W. B. Severe Local Storms Forecast Center, Kansas City*), **The mechanics of instability-line formation**. *Journal of Meteorology*, Boston, 16(2):108-120, April 1959. 9 figs., 2 tables, 13 refs., 4 eqs. **DWB, DLC**—It is proposed that under certain conditions of wind flow the temperature changes due to horizontal advection and vertical motion produces a trend towards the formation within a few hours of a line or narrow band of vertical thermal instability associated with a marked increase in low-level convergence along

the same line or narrow band. An assumed distribution of winds, chosen to represent typical conditions observed preceding by a few hours the formation of an instability line, is studied and a model presented. The model agrees well with synoptic observation and studies. The atmospheric mechanism derived is of the mesoscale and is directly applicable to instability line formation in the "High Plains" and most pre-cold frontal instability lines in other areas can be explained by it. *Subject Heading: 1. Instability line formation.* —*Author's abstract.*

12.2-285

551.511.13:551.524.4:551.578.46

Péczely, György, *Adatok a hórétteg hűtőhatásához.* [Data on the cooling effect of snow cover.] *Időjárás*, Budapest, 62(6):329-331, Nov./Dec. 1958. 2 figs., table, ref. Russian summary p. 329. **DLC**—Data on cooling with and without snow cover in the absence of advection and turbulence are compared for clear and cloudy nights (Szombathely, Budapest, Debrecen, 1931-1955). It is found that during mid-winter (Jan.-Feb.) snow cover lowers the temperature by an average of 9°C on clear nights and 5-6°C on cloudy nights in Hungary. A case is presented in which one half of Hungary is covered with snow and minimum temperatures are found to agree closely with the snow cover distribution. *Subject Headings: 1. Cooling effect of snow cover 2. Hungary.*—*Transl. of author's abstract (G.T.).*

12.2-286

551.511.2:551.513.2

†Wiin-Nielsen, A. (*Air Weather Service, Suitland, Md.*), *A study of energy conversion and meridional circulation for the large-scale motion in the atmosphere.* *Monthly Weather Review*, Wash., D. C., 87(9):319-332, Sept. 1959. 9 figs., table, 23 refs., 5 eqs. **DWB, DLC**—Energy conversion between potential and kinetic energy is considered. Sec. 2 contains the derivations which are necessary to compute the energy conversion for a large region on the basis of vertical velocities and relative topography as obtained from a two-parameter model presently used by the Joint Numerical Weather Prediction Unit. The energy conversion is divided into three parts: (1) energy conversion due to a mean vertical velocity over the region, (2) energy conversion in meridional planes, and (3) energy conversion in the zonal planes. Sec. 3 contains a discussion of the results obtained for the months January and April 1959. The energy conversion is positive for each day in both months, but the conversion in the meridional planes has a different sign in the two months, being positive in January and negative in April. The pattern of the mean meridional circulation is discussed and the frictional dissipation estimated. Sec. 4 describes a procedure for an evaluation of the energy conversion for the different wave numbers, and discusses the results for the same two months. The same section contains a comparison with results obtained from a linear, adiabatic theory. Sec. 5 contains a discussion of the modifications to the results in section 4 caused by the diabatic heating of the atmosphere. It is made plausible that the maximum conversion found for the small wave numbers by an adiabatic computation is greatly altered due to the effects of the heating. *Subject Headings: 1. Energy conversions 2. Meridional circulation 3. Large scale circulation.*—*Author's abstract.*

12.2-287

551.511.3:551.576.1

Gutman, L. N., *Teoreticheskaya model' kuchevoogo oblaka.* [Theoretical model of the cumulus.] *Akademiia Nauk SSSR, Doklady*, 112(6):1033-1036, Feb. 21, 1957. 2 figs., 15 eqs. **DLC.** Transl. into English available Associated Technical Service, P.O. Box 271, East Orange, N. J. as its *ATS-95 K20R*.—A theory based upon the basic thermohydrodynamic steady state equations of the atmosphere is proposed, reflecting the general motion of the atmosphere, horizontal variation of relative humidity, turbulence, the Coriolis force and a few small order members in the development. A system of characteristic functions to be computed once and for all is derived. A demonstration of the results with reasonable numerical values resembles the processes in a cumulus cloud including the anvil shape of its upper part, originating under certain defined conditions. *Subject Headings: 1. Cloud theories 2. Cumulus clouds.* —*A.A.*

12.2-288

551.511.32:551.552:551.557.2:551.43

Gumiia, S. U., *Perevalivanie vozdukhnykh potokov cherez gornye khrebyty.* [The passage of air streams over mountain ranges.] *Metereologiya i Gidrologiya*, Leningrad, No. 10:3-8,

Oct. 1958. 2 figs., 9 refs., 19 eqs. DWB, DLC—The passage of air masses, having large vertical extensions, across the mountain ranges of the Transcaucasus is associated with the formation of cloudiness, extensive precipitation and thunderstorms on the mountain slopes. These phenomena are described by the hydrodynamic equations and the equation of continuity. From these equations the author presents the derivation of 16 equations for determining the function of flow $\tilde{\psi}$ for individual points of the earth's surface under investigation, namely:

$$\psi = \psi_0 + \psi'$$

and for ψ' for the mean level of the troposphere, taking into account the influence of mountain ridges, namely:

$$\Delta\psi' - \left(\frac{\partial \ln \pi}{\partial x} \frac{\partial \psi'}{\partial x} + \frac{\partial \ln \pi}{\partial y} \frac{\partial \psi'}{\partial y} \right) = \bar{v}_0 \frac{\partial \ln \pi}{\partial x} - \bar{u}_0 \frac{\partial \ln \pi}{\partial y}$$

This equation was solved by means of finite differences for 40 points in the Caucasus for the case $u=0$ and $v=1$ and $u=0$ and $v=0$. The distribution of stream lines for the mean level of the troposphere in the Caucasus is shown on maps. The unevenness of the relief of the earth's surface forms a field of disturbance in the principal flow extending up to 4–5 km. *Subject Headings: 1. Air flow over mountains 2. Orographic effects on upper air flow.*—I.L.D.

12.2-289

551.511.32:551.556:628.1

Tareev, B. A., *Statsionarnyĭ vetrovoy nagon i tsirkuliatsiia v priamougol'nom basseine maloi glubiny*. [Stationary wind-driven current and circulation in a rectangular basin of slight depth.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 9:1139–1144, Sept. 1958. fig., 2 refs., 21 eqs. DLC—It has been demonstrated (A. I. FEL'ZENBAUM, *Akad. Nauk SSSR, Dokl.*, 109, No. 1, 1956; see 9F-126) that if the horizontal viscosity and the nonlinear terms are neglected in the equations of motion, the problem of stationary wind circulation in a sea of slight depth is reduced to the solution of the equation

$$\frac{\partial}{\partial x} \left(\frac{1}{h^3} \frac{\partial \psi}{\partial x} \right) + \frac{\partial}{\partial y} \left(\frac{1}{h^3} \frac{\partial \psi}{\partial y} \right) = \frac{1}{2\mu} \text{rot}_z \frac{T}{h}.$$

In the case of circulation in a rectangular basin with constant but little depth, the Coriolis acceleration is insignificant and the problem is reduced to the solution of this equation for $h = \text{const}$. It assumes the form

$$\Delta\psi = \frac{h^2}{2\mu} \text{rot}_z T$$

where $\Delta = \frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}$ = two-dimensional Laplacian operator. A formula completely solving the problem of the circulation in a rectangular basin of constant depth developing under the influence of a selected wind wave is derived, namely:

$$\psi = \frac{h^2}{2\mu} (a_2 - a_1) \frac{16l^2}{\pi^3} \sum_{n=0}^{\infty} \frac{(-1)^n}{(2n+1)^2} \left[\frac{ch \partial_n y}{ch \partial_n L} - 1 \right] \cos \alpha_n x.$$

Also a formula giving an approximate expression for the slope of the surface in the cross wind is derived, namely:

$$\frac{\partial q}{\partial x} = \frac{3\partial l}{2\rho gh} \frac{8}{\pi^2} \cos \left(\frac{\pi x}{2l} \right) \frac{ch \left(\frac{\pi y}{2l} \right)}{ch \left(\frac{\pi L}{2l} \right)}.$$

A diagram giving a representation of the general character of the circulation corresponding to the desired formula for $a_2 = a$, and $a_1 = 0$ is presented. *Subject Headings: 1. Wind driven currents 2. Shallow water circulation.*—I.L.D.

12.2-290

551.511.33:551.524.77

Giaô, Antonio and Roulleau, Jean, **Sur la variation avec l'altitude du gradient vertical moyen dans l'atmosphère libre.** [The variation of the mean vertical gradient with altitude in the free atmosphere.] *Académie des Sciences, Paris, Comptes Rendus*, 250(5):896-898, Feb. 1, 1960. ref., 6 eqs. **DWB, DLC**—The application of the thermodynamic equation to an atmosphere in movement permits a simple expression of the vertical thermal gradient variation according to altitude. This expression is as follows:

$$\frac{\partial T}{\partial Z} = -\frac{g}{C_p} - \frac{1}{\omega} \left(\frac{\partial T}{\partial t} + \vec{V}_h \nabla T \right)$$

T being the absolute temperature, Z the altitude, t the time, g the gravity acceleration, $\vec{V}_h$ the horizontal component of the speed, ω its vertical component and ∇ the gradient operator. When granting that the mean state of the atmosphere is comparable to a permanent state, one can admit that the mean tropospheric wind is a linear function of the altitude. Hence, admitting that the mean wind is geostrophic even in the calculation of horizontal divergence and that movements of the air are adiabatic, one finds

$$\frac{\partial^2 T}{\partial Z^2} + \frac{1}{T} \left(\frac{\partial T}{\partial Z} \right)^2 + \frac{1}{T} \left(\frac{g}{C_p} + \frac{g}{R} \right) \frac{\partial T}{\partial Z} + \frac{1}{T} \frac{g^2}{RC_p} = 0$$

with R = the constant of gases for the air. From this equation the authors determine the value of $\partial T / \partial Z$ by a simple quadrature, working on slabs whose thickness ΔZ is sufficiently small so that the temperature T can be considered to be a constant. It is thus possible to compute $\partial T / \partial Z$ for various altitudes through proceeding step by step from only one initial condition: the value of $\partial T / \partial Z$ at the level Z_0 . The values computed are in good agreement with those observed. *Subject Headings:* 1. Thermodynamics of the atmosphere 2. Vertical temperature gradient.—A. V.

GENERAL CIRCULATION

See also: Atmos circulation effects on sunshine duration (Schindler), 12.2-206; Circulation types (Monin, Obukhov), 12.2-235; Large scale circulation (Wiin-Nielsen), 12.2-286; Cold air invasions, Yugoslavia (Robavs), 12.2-312; Meridional circulation models (Koschmieder), 12.2-367.

12.2-291

551.513:551.461.2

Girs, A. A., **Mnogoletnie preobrazovaniia form atmosfernoï tsirkulatsii i sviazannye s nimi kolebaniia urovnia okeanov i moreï.** [Long-period changes in the forms of air circulation and associated variations in sea level changes.] *Leningrad. Gidrometeorologicheskii Institut, Materialy konferentsii po probleme Vzaimodeistvie atmosfery i gidrosfery v severnoï chasti Atlanticheskogo okeana*, Vol. 1, pub. Leningrad, 1958. p. 24-38. 6 figs., 6 refs. **DWB**—The transformations of the atmospheric circulation types W, C and E (established by G. I. A. VANGENGHEIM) were applied by the author to the investigation of long period oscillations of the levels of the Pacific and Atlantic Oceans in order to obtain relationships for solving the problems of the interaction of atmosphere and hydrosphere in the North Atlantic. The secular transformations of the types W, C and E during the period 1890-1955 as illustrated by monthly frequencies of anomalies and the relationship of anomalies to variations in solar activity, especially the 80-90 and 11-year solar cycles are reviewed with the aid of integral curves of monthly number of days with W, C and E types and also Z, M₁, and M₂ types. The secular variations of the level of the Caspian, Baltic, Mediterranean and Arabian Seas and also of the Atlantic Ocean and their relation to the concomitant variations of W, C, E are discussed with the aid of graphs and explained in terms of the behavior of the Icelandic Low and Azores High, Aleutian Low and Hawaiian High and the resulting wind flow. The data presented shows that the secular oscillations of sea and ocean levels are determined principally by the transformations of W, C and E types as indicated by the relation of these transformations to the temperature variations of the 200 meter water level on the Kola meridian. Since sea level oscillations depend also upon purely oceanographic elements and since in the classification of

W, C and E identical characteristics are not always employed there is no detailed correspondence between these types and hydrological processes. A method for establishing types of homogeneous synoptic processes necessary for computing dynamic and thermal properties of the hydrosphere of the North Atlantic is outlined. *Subject Headings:* 1. Circulation type frequencies 2. Ocean-atmosphere interaction 3. Sea level changes.—*I.L.D.*

12.2-292

551.513.2:551.557.5

Koppány, György, *A futóáramok tanulmányozásának legújabb eredményeiről*. [Recent results of jet stream studies.] *Időjárás*, Budapest, 62(2):115-116, March/April 1958. 5 refs. DWB, DLC—Recent literature on jet stream research is reviewed, including POGOSIAN's investigation of jet stream height variations, jet formation theory by NAMIAS and CLAPP, determination and forecasting of jet stream position and intensity (BORISENKOV), and geographical distribution of jet streams (POGOSIAN). *Subject Headings:* 1. Jet stream research 2. Jet stream forecasting 3. Jet stream theories.—*G.T.*

ATMOSPHERIC DISTURBANCES

See also: Wind and pressure in hurricanes (Gilman, Myers), 12.2-84; Microseism-cyclone relationships (Chakrabarty), 12.2-139; Cyclones, Indian seas, 12.2-203; Cold air invasions (Čadež), 12.2-232; Synoptic conditions for typhoons, N. Pacific, 12.2-234; Severe storm forecasting (Fawbush et al.), 12.2-239; Hurricane forecasting (Malone), 12.2-244; Model of hemispheric cyclonic pattern (Lowell), 12.2-281; Frontal passage effects (Sekiya), 12.2-332; Cyclone effects on altimeter readings (Gherzi), 12.2-342; Jet stream-tornado relationships (Taylor), 12.2-366; Mountain waves, Spain (Ledesma), 12.2-370; Anticyclone-humidity relationships (Maksić), 12.2-374; Cumulonimbus formation (Knöll et al.), 12.2-391; Aerosomatic classification (German), 12.2-409; Thunderclouds (Chapman), 12.2-428.

12.2-293

551.515:551.574.42(773)

Joos, Lothar A. (*State Climatologist, U. S. W. B., Champaign, Ill.*), *The midwinter storm in Illinois*. *Weatherwise*, Boston, 12(2):47-48, April 1959. photo. DWB—Further details of this storm, as it affected Illinois with cold waves, blizzards, sleet, heavy glaze, wind storms, tornadoes and floods. In Springfield area this was the worst glaze storm since Dec. 17-18, 1924. In the Champaign area this was the worst ice storm in 50 years. Photo shows damage to trees in a street of Springfield. *Subject Headings:* 1. Ice storms, Illinois (1959) 2. Record ice storms 3. Glaze storms 4. Springfield, Ill. 5. Champaign, Ill.—*M.R.*

12.2-294

551.515.11:551.515.4:551.557.5(470)

§Kravchenko, I. V., *Zimnie grozy v 1958 goda*. [Winter storms attended by lightning in 1958.] *Priroda*, Moscow, No. 7:89-91, July 1958. fig. DLC—During Jan., Feb. and March, 1958, the atmospheric processes in European USSR were characterized by marked intensity. Subtropical air masses frequently collided with Arctic air masses so that at their boundaries atmospheric fronts with intense cyclonic activity developed. Cyclones traveled from west to east with great velocity reaching 90-100 km/hr. The rapid movement of cyclones from the Atlantic Ocean to European U.S.S.R. was accompanied by the transport of relatively warm moist and unstable oceanic air masses. The interaction of these air masses with arctic air was accompanied by intense ascending air movements and the formation of thunderstorms over various cities in European USSR. All these thunderstorm occurrences were characterized by jet streams whose wind velocity attained 250 km/hr at heights of 7-12 km. During these three months seven centers of thunderstorm activity were recorded in European U.S.S.R. Each case of thunderstorm activity is described and a synoptic map of Jan. 18, 1958, 0600 o'clock, is presented. *Subject Headings:* 1. Winter thunderstorms 2. Cyclone dynamics 3. Jet stream winds 4. U.S.S.R.—*I.L.D.*

12.2-295

551.515.11:551.511.6:551.524.4

Longley, Richmond W. (*Met. Branch, Dept. of Transport, Canada*), *Eddy sizes as determined by the temperature fluctuations at O'Neill, Nebraska, Aug. and Sept. 1953*. *Journal of Meteorology*, Boston, 16(2):140-143, April 1959. 2 figs., 3 tables, 5 refs. DWB, DLC—

Data obtained at O'Neill, Nebraska, during the summer of 1953, particularly data dealing with temperature fluctuations have been examined to obtain information on eddy sizes. It was found that under conditions of lapse and slight inversion, the eddy sizes affecting any one level varied only slightly. Thus, on the assumption that the vertical temperature distribution was logarithmic, it was calculated that two thirds of the eddies affecting the 2-m level under these conditions lay between 0.5 m and 7.5 m in vertical extent. With increasing stability, the sizes decreased rapidly. Under all conditions of stability, the eddy size increased with height. Under inversion conditions, the increase was more rapid and, under lapse, less rapid than the logarithm of the height. *Subject Headings:* 1. Eddy size variations with height 2. Vertical temperature distribution 3. Atmospheric turbulence 4. Turbulence structure 5. O'Neill, Nebr.—*Author's abstract.*

12.2-296

551.515.11:551.43 (234.42)

§Romov, A. I., *Orograficheskaia evoliutsiia tsiklonov, peremeshchaiushchikhsia cherez Karpaty na Ukrainu.* [Orographic evolution of cyclones moving across the Carpathian Mountains into the Ukraine.] *Kiev, Ukraine. Nauchno-Issledovatel'skii Institut, Trudy*, No. 5:86-117, 1956. 23 figs., 12 refs., 11 eqs. **DWB, DLC**—In the first part of the paper the author presents a qualitative theoretical analysis of the influence of mountain ranges on the change of pressure and the development of cyclones. In the second part he discusses the evolution of Genoese cyclones near the Dinaric Alps and over the Hungarian plain and their displacement from the Hungarian lowland into the European U.S.S.R. across the Carpathian Mountains. The study is illustrated with examples of cyclone evolution taken from synoptic charts of 1947, 1952 and 1953. *Subject Headings:* 1. Cyclone movement 2. Orographic effects on cyclones 3. Ukrainian S.S.R.—*A.M.P.*

12.2-297

551.506.1:551.515.13 (698.2)

Davy, E. G., *The cyclone season 1958-59.* *Revue Agricole et Sucrière de l'Île Maurice*, Port Louis, 38(6):264-268, Nov./Dec. 1959. 2 figs. **DA**—Eleven tropical depressions occurred in the season from November, 1958 to May, 1959. The second half of the season was particularly active. Plantations, installations and communications in many parts of Madagascar were seriously damaged on more than one occasion. Two cyclones which passed near Tromelin Island were among the most severe on record in this region and emphasized the value of island observing stations. Rodrigues suffered two cyclones, the second in April was rather severe. Mauritius and the Lesser Dependencies had a relatively quiet season. A schematic map reproduces the paths of the principal cyclones. Two graphs indicate the variation of atmospheric pressure observed during the cyclones of March 3-4 and March 24-25. During the latter a fall of pressure of 55 mb in 12 hours was observed, of which 45 mb in 6 hours and 7 mb in a few minutes. *Subject Headings:* 1. Climatic summaries 2. Cyclonic activity 3. Cyclonic paths 4. Mauritius Island.—*A.V.*

12.2-298

551.515.13:551.43

Manohin, V. (*Yugoslavia*), *K voprosu ob orograficheskom tsiklogeneze.* [The problem of orographic cyclogenesis.] *Meteorologija i Hidrologija*, Leningrad, No. 6:19-22, June 1958. 4 refs., eqs. **DWB, DLC**—The mechanism of formation of the Genoa cyclones which often produce extensive precipitation over the southern slopes of the Alps including adjoining areas of Yugoslavia is discussed. The synoptic situation associated with the formation of the Genoa cyclone is described in detail. Over the western Mediterranean a high altitude trough directed from the north is formed. Masses of cold air in the area of this trough flow through the trough into North Africa and warm air spreads in the anterior part of the trough, the Balkan Peninsula and through Central Europe. The trough aloft moves eastward and on its anterior part above the warm southwest flow there appears a cold southwest flow with cold air which had spread earlier into North Africa and through the western Mediterranean. The cooling of the warm southwest flow aloft causes the air aloft in the anterior part of the trough to become unstable and this instability is increased near large orographic barriers. The resulting precipitation is accompanied by the formation of a low pressure region over the Gulf of Genoa and its extension through north Italy and the Adriatic Sea. The elevation of the air masses near the

mountains is the cause of this cyclone. Approximate computations illustrating the formation of an orographic cyclone are presented. And the formation of orographic cyclones is explained by means of the equation of vortical velocity of FRIDMAN as expressed by A. T. MATVEEV. *Subject Headings: 1. Orographic effects on cyclogenesis 2. Gulf of Genoa 3. Western Mediterranean.—I.L.D.*

12.2-299

551.515.2:551.577.37 (94)

Brunt, A. T., *The Crohamhurst storm of 1893*. (In: Australia. Bureau of Meteorology, *Conference on estimation of extreme precipitation, Melbourne, April 1958*. Melbourne, Dec. 1958. p. 191-228. 11 figs., 9 tables, 7 refs.) DWB—Nearly 36 in. of rain in 24 hrs in February, 1893, created an Australian record which stands today. A study is made of the cyclone which led up to the record rainfalls over the Blackall Range in southeast Queensland with subsequent disastrous flooding in the Brisbane and Mary Rivers. The meteorology of the storm is examined by reconstruction of surface charts based on original rainfall and weather records. Basin rainfalls over a four-day period are calculated and the maximization of the storm discussed. *Subject Headings: 1. Cyclonic storms 2. Record rainfall 3. Crohamhurst, Queensland.—Author's abstract.*

12.2-300

551.585:551.515.2 (261)

Haggard, William H. and Cry, George W. (*both, U. S. W. B.*), *A climatological index for North Atlantic tropical storm activity*. (In: Technical Conference on Hurricanes, Miami Beach, Fla., Nov. 19-22, 1958, *Proceedings*, issued 1958 (?). Section A1 (10 p.). 6 figs., 3 tables, 2 refs.) DWB (M15.2 A512pr)—A simple intensity index as based on maximum wind velocities is demonstrated and discussed. Tabulated daily data (1899-1958) are available for computations to moderate the index as need be. *Subject Headings: 1. Climatic indexes 2. Tropical wind storm velocities 3. North Atlantic.—W.N.*

12.2-301

551.515.21

Hawkins, H. F. and Gentry, R. C. (*both, U. S. W. B.*), *Case studies of tropical cyclogenesis*. (In: Technical Conference on Hurricanes, Miami Beach, Fla., Nov. 19-22, 1958, *Proceedings*, issued 1958 (?). Section G3 (8 p.). 2 figs.) DWB (M15.2 A512pr)—The case of hurricane "Daisy" and the storm "Becky" is considered here. The main contrast found was that the latter moved faster than the wind recorded within 100 miles of the storm center, or in other words presented the inhibitive ventilation which probably contributed to her lack of intensification. This paper is part of the current extensive NHRP examination of hurricane formation. *Subject Headings: 1. Tropical cyclogenesis studies 2. Hurricane analysis.—W.N.*

12.2-302

551.515.2

Keiderling, S. F., *Die Hurrikane Daisy und Fifi im Spiegel von Kapitänsberichten*. [Hurricanes "Daisy" and "Fifi" according to a captain's reports.] *Wetterlotse*, Hamburg, No. 137:225-236, Oct. 1958. 3 figs., 2 tables. DWB—These reports are not based upon encountering the hurricanes but by being close enough to learn something about them. The observations are accompanied by graphs. *Subject Headings: 1. Hurricane "Daisy" (1958) 2. Hurricane "Fifi" (1958).—W.N.*

12.2-303

551.515.2:551.556:551.465

Reid, Robert O. (*A. & M. College of Texas*), *On the classification of hurricanes by storm tide and wave energy indices*. *Meteorological Monographs*, Boston, 2(10):58-66, June 1957. 7 figs., 2 tables, 8 refs., 15 eqs. DWB, DLC—Two indices for tagging hurricanes with respect to their capacity for producing storm tides and waves on a continental shelf are suggested. Application of these indices to the hurricane data of the United States since 1900 indicates that the logarithms of these indices possess nearly Gaussian distribution. This affords an approximate means of evaluating the average rate of occurrence of storms having a given level of intensity, defined by either the wave energy index or storm tide potential for a particular site. A rate of occurrence is computed for the northwestern Gulf of Mexico shelf area. *Subject Headings: 1. Hurricane classification 2. Storm tides 3. Hurricane waves.—Author's abstract.*

12.2-304

551.515.2:621.396.9

Rodewald, Martin, *Drohende Doris* (Juli 1959). [Threatening "Doris" (July 1958).] *Wetterlotse*, Hamburg, No. 135:202-206, Sept. 1958. fig., 2 tables. DWB—The data of July 23-28, 1958 concerning Hurricane "Doris" as they were transmitted from radio station Quickborn, are presented here. It is apparent that the completeness of data is impressive and a well chosen example of a modern weather service in action. *Subject Heading: 1. Hurricane "Doris" (1958).—W.N.*

12.2-305

551.515.2:551.552(26)

Schwerdtfeger, Werner (*Buenos Aires, Argentina*), *A rapid method to determine light surface wind during reconnaissance flights*. *American Meteorological Society, Bulletin*, 37(7):369, Sept. 1956. 2 refs. DWB—A technique which the author used in aerial reconnaissance during World War II, is suggested for use in determining surface winds over the sea where they are not yet of gale force and yet must be known to locate the exact place where the hyperbolic point at the boundary of a hurricane should be. A machine gun installed in the plane is used to fire a volley at a forward angle into the sea, such that a cloud of water drops is sprayed into the air just above the surface and is carried away by the wind at a rate which can be estimated by the time the plane arrives over the spot. *Subject Headings: 1. Hurricane reconnaissance 2. Sea surface wind observations 3. Machine gun wind estimation techniques.—M.R.*

12.2-306

551.515.21/23(267)

Prudhomme, A. and Valtat, B. (*both, Ingenieur des Travaux Metcor., Tananarive*), *Sur la formation et l'évolution des cyclones tropicaux du S. W. de l'Océan Indien au cours de la saison chaude 1952-53*. [On the formation and evolution of tropical cyclones of the south-west Indian Ocean during the hot season of 1952-53.] (In: Pan Indian Ocean Science Congress, Aug. 1954, Perth, Western Australia, *Proceedings of Section A, Physical Sciences*, [pub. 1958?]. p. 64-68. 12 refs.) DWB (506.35 P187pr)—During the 1952-1953 hot season tropical cyclones, whose characteristic features are discussed in this report, developed over the southwest Indian Ocean. The author describes the evolution of the cyclones, and their activities over the area. *Subject Headings: 1. Cyclone formation 2. Cyclone development 3. Indian Ocean.—N.N.*

12.2-307

551.515.21/3(265/266)

Rudloff, Willy, *Ein Beispiel tropischer Zwillings-Zyklonen*. [An example of tropical twin cyclones.] *Der Wetterlotse*, Hamburg, No. 128:49-51, March 1958. fig. DWB—Brief note on GORDON A. DEAN's paper *An example of tropical cyclogenesis, symmetrical with respect to the Equator* (see 6.8-210) which was based on a close analysis of numerous weather reports of a Japanese fishery fleet operating in the central Pacific 1°-5°N, 150°-170°E from March-May 1951. A map shows areas of origin and tracks of the hurricane "Joan" and her twin sister born north and south of the equator. *Subject Headings: 1. Tropical cyclones 2. Hurricane "Joan" (1951) 3. Pacific Ocean.—W.N.*

12.2-308

551.509.3:551.515.21(265)

*Sekioka, M. (*Met. Res. Inst., Kyoto Univ.*), *Synoptic structure of typhoons Louise, Kezia and Jane passing over the Japan Sea (Hypothesis on complex of tropical and extratropical cyclones for typhoon in the middle latitudes, Pt. 2)*. *Meteorological Society of Japan, Tokyo, Journal*, Ser. 2, 34(6):336-345, Dec. 1956. 15 figs., 9 tables, 3 refs. DWB, DLC—From the synoptic analysis of redeveloped Typhoon "Marie," the hypothesis is presented that this typhoon is a complex system of the main typhoon and the extratropical cyclone and that redevelopment is due to the development of accompanying extratropical cyclone. In order to confirm this hypothesis the author used the same method to analyze typical typhoons that passed through Kyushu Island in 1950 (typhoon "Louise" (Fig. 1), "Kezia" (Fig. 8), and "Jane" (Fig. 12)), of which only "Louise" maintained her central pressure of ca. 980 mb with no redevelopment. *Subject Headings: 1. Synoptic structure of typhoons 2. Japan Sea.—K.C.*

12.2-309

551.515.22:656.6.05

Myers, Vance A. (*Hydromet. Sec., U. S. W. B.*), **Distribution of dangerous winds in a hurricane.** *Mariners Weather Log*, Wash., D. C., 3(5):169-173, Sept. 1959. 5 figs., 3 refs. **DWB**—Applications and limitations of marine navigational rules in relation to wind distribution in hurricanes are discussed. The concept of rotation-plus-forward motion is not reliable as exemplified by the German schooner "Pamir's" disaster in hurricane "Carrie." It is suggested that mariners (1) avoid any bearings of the central area in a fully developed hurricane, (2) heed radio warnings of gale distribution, and (3) remember that the strongest gales tend to be where the isobars on a weather map are closest. *Subject Headings: 1. Hurricane wind distribution 2. Marine navigation.—W.N.*

12.2-310

551.515.3(729.6)

Beynon, A., **Waterspout at Nassau, Bahamas, April 12, 1957.** *Meteorological Magazine*, London, 88(1040):47-49, Feb. 1959. 6 figs. (incl. photos), table. **DWB, DLC**—The violent life history of a waterspout near Nassau as observed by an air pilot is given here. The photos of the waterspout in action are excellent, and the path is well mapped. *Subject Headings: 1. Waterspouts 2. Nassau, Bahamas.—W.N.*

12.2-311

551.515.21:551.43

†McClain, E. Paul, **Some effects of the Western Cordillera of North America on cyclonic activity in the United States and Southern Canada.** Florida. State Univ., Tallahassee. Dept. of Meteorology, Contract Nonr-1600(00), Technical Report, No. 12, Dec. 15, 1958. 49 p. 7 figs., 10 tables, 28 refs., 11 eqs. **DWB (M(055) F636t)**—This report presents the results of an investigation which sought more satisfactory physical explanations for the observed behavior of cyclonic storm systems over and in the vicinity of the Western Cordillera of North America. Smoother terrain contours were constructed and then used to estimate where and under what synoptic conditions orographically induced vertical motions might systematically alter the vorticity tendency field. Two general hypotheses evolved from the analysis: (1) Lee cyclogenesis.—A low-level leeside trough is established and positive vorticity tendencies are generated in this region by the nature of the orographic vertical velocities. Whether or not major cyclonic storms develop from this trough is dependent upon the subsequent superposition of high-level divergence. (2) Windward retardation and cyclolysis.—Mature cyclones approaching the windward slopes decelerate, recurve northward and weaken due to the combined action of low-level orographic vertical velocities, friction, and the relatively unimpeded progression of the high-level portion of the system. A detailed case study is presented to illustrate and, to some extent, to verify the hypotheses outlined above as well as some other synoptic-scale mountain effects. *Subject Headings: 1. Orographic effects on cyclogenesis 2. Cyclonic activity 3. North America.—Author's abstract.*

12.2-312

551.515.8:551.513.1(497.1)

Robavs, Majda, **L'irruzione di "gocce" d'aria fredda in Slovenia.** [Incursion of cold air drops in Slovenia.] *Geofisica e Meteorologia*, Genoa, 6(3/4):49-50, 1958. 2 figs. Italian, English and German summaries p. 50. **DLC**—During winter the cold air drops which are of interest in Slovenia arise most frequently from the east or northeast, developing as a result of a blocking effect. They move across the Pannonian plain to the warm Adriatic Sea whereby a low develops over the Adriatic as a result of vertical exchange. The weather in Yugoslavia is a side effect of the "drop." The distribution of precipitation in Slovenia during the occurrence of such lows differs from that associated with Genoa cyclones. A similar process occurs in summer when the "drop" remains stationary over the Pannonian plain. The bad weather is displaced thereby to eastern Slovenia. *Subject Headings: 1. Cold air invasions 2. Blocking action 3. Yugoslavia.—I.L.D.*

12.2-313

551.515.811

†Eliassen, Arnt (*Univ. Oslo*), **On the formation of fronts in the atmosphere.** (In: Bolin, Bert (ed.), **The atmosphere and the sea in motion.** N. Y., Rockefeller Institute Press, 1959. p. 277-287. 4 figs., 111 refs., 8 eqs.) **DLC**—Whereas large-scale horizontal deformation fields can satisfactorily explain the formation of relatively broad frontal zones, it is doubtful

whether they suffice to produce sharp fronts. The frontogenetic effect of transverse circulations produced by the combined effect of surface friction and released heat of condensation is studied theoretically, and it is found that these effects may cause a diffuse frontal zone to develop into a sharp front within a time of about one day. It is suggested that a similar mechanism may perhaps explain the formation of the eye of tropical cyclones. *Subject Headings: 1. Frontal development 2. Large scale circulation.—Author's abstract.*

12.2-314

551.515.83 551.524.31:551.547:551.509.33

Kálmán, Éva (*Cseh*), *A hideggócok mozgása és hatásuk a Kárpátmedencében*. [Movement of cold centers and their effect upon the Carpathian basin.] *Időjárás*, Budapest, 63(5):286-290, Sept./Oct. 1959. 4 figs., 3 tables, 3 refs. Hungarian and German summaries p. 286. **DLC**—The monthly distribution of the origin and the path of cold centers to be found on the 500/1000 mb RT charts are discussed. Gives information concerning the velocity and warming up of the cold centers. The connection between the changes of the 500/1000 mb RT values and the daily mean temperature serves as a base for long range temperature forecast. The observation covers a 5 year period (1954-1958). *Subject Headings: 1. Cold centers 2. Long range temperature forecasting 3. Carpathian Basin.—E.K.*

12.2-315

551.515.83(728)

Portig, Wilfried (*San Salvador*), *Frontdurchgang in Mittelamerika*. [Frontal passage in Central America.] *Meteorologische Rundschau*, Berlin, 11(4):112-116, July/Aug. 1958. 4 figs., 2 tables, 2 refs. **DWB, DLC** Under the influence of Pacific Coast mountain ranges and the Appalachians, which act as a funnel, cold fronts penetrate into Central America. They alter the wind structure, reduce the daily variation of temperature and wind direction and are occasionally accompanied by showers and thunderstorms. Normally they are followed by a high pressure area over the Gulf of Mexico which produces in Central America a north wind opposite to the pressure gradient. Above the shallow north wind diverse winds can prevail but these have the following common features: maximum of northerly wind velocity is below 1000 m above the ground, the minimum wind velocity is approximately 1000 m above the ground and immediate rapid rotation from northeast to south southeast above the second velocity maximum when such is present. A specific cold front passage in San Salvador which occurred in January, is described in detail with the aid of a synoptic map giving positions of low pressure areas and their fronts at given times in January 1958. Graphs of wind direction, temperature, and numerical data on wind directions and speeds at elevations from 0-3800 m at given times in San Salvador-Ilopango, are presented. Finally, the deviation of the north wind from the pressure gradient, the complicating role of air mass, change in frontal analysis, distribution of cold fronts in Central America, etc. are discussed. *Subject Headings: 1. Frontal passages 2. Cold fronts 3. Frontal analysis 4. Central America.—Author's abstract and I.L.D.*

RADIATION AND TEMPERATURE

RADIATION

See also: Radiation terminology (Duffieux), 12.2-33; *Radiation effect on spray applications* (Riepma), 12.2-62; *Solar radio radiation obs.* (Wild, Sheridan), 12.2-96; *Solar radiation measurement during eclipses* (Ikeda), 12.2-99; *Solar radiation sources* (Maltby), 12.2-102; *Earth's rotation-solar corpuscular radiation effects* (Danjon), 12.2-121; *Sunshine duration measurement* (Schindler), 12.2-206; *Solar radiation measurement* (Kassander), 12.2-207; *Use of radiation data in temp. forecasting* (Myers), 12.2-240; *Turbidity factor* (Kitaoka), 12.2-419.

12.2-316

551.521:551.524.4

Sakali, L. I. and Gagarina, T. E., *Nekotorye rezul'taty izmereniia radiatsionnogo balansa deiatel'noi poverkhnosti*. [Certain results from measurements of the radiation balance of an active surface.] *Meteorologiya i Gidrologiya*, Leningrad, No. 8:31-35, 1957. 3 figs., 3 tables, ref. **DLC, DWB**. Transl. available. **DWB** (M21 5158ce). Review by D. Jellinek in *Wetter*

und Leben, 10(5/7):105, 1958. —Radiation measurements by means of a pyrgeometer, actinometer, pyranometer and an albedo meter (constructed by I. D. IANISHEVSKIĬ) were made over the period June 12–19 and July 8–18, 1955 on the Stalin State Farm near Gradenitza in Odessa Oblast and at the Pakhta-Aral oasis in Kazakhstan in order to measure radiational balance of fallow land. Data are presented on radiational balance ($\text{cal/cm}^2/\text{sec}$), diurnal variation of radiational balance and its components, daily variation of counterradiation at Gradenitza and at the Pakhta-Aral oasis, radiational balance on clear nights and on the relationship between radiational balance and vertical temperature gradient. Daily totals of radiational balance with a clear sky are less (423.2 and 435.3 $\text{cal/cm}^2/24$ hrs) than with cloudy sky but unclouded sun (461.0 and 482.3 $\text{cal/cm}^2/24$ hrs.). Increased radiation balance is accounted for by diffuse radiation. The total radiation balance during the night -30.2 $\text{cal/cm}^2/\text{night}$ with a clear sky but -18.6 $\text{cal/cm}^2/\text{night}$ with a cloudy sky. Effective radiation at Gradenitza is somewhat less than at Pakhta-Aral, owing to the greater counterradiation at Gradenitza. During the morning hours the radiational balance at Gradenitza passes through zero an hour later than at Pakhta-Aral and during the evening an hour earlier. The differences in daily variation of radiation balance and of its constituents are small at these two localities so that the radiational conditions of the southern Ukraine approximate those of semiarid regions. Finally, effective radiation is increased by the pressure of dew. Irrigation increases the radiational balance of an active surface. *Subject Headings: 1. Radiation balance 2. Vertical temperature gradient 3. Gradenitza, Odessa Region 4. Pakhta-Aral oasis, Kazakh S.S.R.—I.L.D.*

12.2-317

551.521:551.524:629.13

Shaffer, L. H. and Speyer, E. (both, Central Research Laboratory, American Machine & Foundry Co., Stamford, Conn.), **Shape and surface factors affecting radiant energy steady states.** *Solar Energy*, Phoenix, Ariz., 3(1):40-43, Jan. 1959. table, 5 refs., 2 eqs. DWB—An analysis is made of the steady state temperatures reached by bodies exposed to sunlight. The effects of corrugations or concavities are discussed for different over-all configurations; also the effects of blackness, grayness, and color. Numerical results are given for several significant cases, applicable to space vehicles and to solar collectors. *Subject Heading: 1. Radiant energy steady states.—Authors' abstract.*

12.2-318

551.521.11

Takács, Lajos, **Umrechnung der registrierten Sonnenscheindauer auf den idealen Horizont.** [Reduction of recorded sunshine duration to an ideal horizon.] *Időjárás*, Budapest, 62(5):249-260, Sept./Oct. 1958. 3 figs., 14 refs., eqs. English summary p. 249; Hungarian summary p. 259. DLC—The reduction of recorded sunshine to an ideal horizon requires—according to the recommendation of WMO—the determination of the astronomically and locally possible sunshine (S_a and S_e). S_e is to be determined by means of maximal recordings instead of measurements made with theodolites. In this case, however, the sensitivity of the instrument will play an important part in the conversion-coefficient S_a/S_e (especially during the transition seasons) on stations with limited horizons—irrespective of the daily march of sunshine. It appears that the conversion is to be made from simultaneous data of some near station having a good horizon, by taking into consideration the daily march. This method is similar to the well-known quotient-method when conclusions are drawn from short series of simultaneous data on long series of average values. *Subject Headings: 1. Sunshine duration corrections 2. Possible sunshine duration.—Author's abstract.*

12.2-319

551.521.17:537.531:551.510.53 551.521.17.523.74

Roberts, Walter Orr (*High Altitude Obs., Boulder, Col.*), **Indirect Measurement of Solar energy variations in the extreme ultraviolet and X-ray region.** (In: Conference on the use of Solar Energy, Univ. of Arizona, 1955, Transactions, pub. 1958. Vol. I:85-89. table, 15 refs.) DWB—The Sun's emission in the far ultraviolet and soft X-ray region of the spectrum greatly exceeds that expected from blackbody at the Sun's apparent temperature, and also varies greatly from time to time, with attendant upper atmospheric responses. Particularly important are solar emissions at $\lambda 1216$ from Hydrogen Lyman α , and at the range from 2 to 15

angstroms. Large and abrupt variations are suggested here. Emission in the range from 15 to 910 angstroms is also important in the upper terrestrial atmosphere, though it is probably less abrupt in its variations. Visible features of solar activity correlate with some of the indicators of short wave solar changes, so that observational study of these visible phenomena offers a real hope for indirect measurements of the relevant solar emissions. Consequently, solar astronomers everywhere are continuing their intensive efforts to observe all discernible features of solar activity. At High Altitude Observatory we are commencing the publication of new indices of the activity of the solar corona. We are also extending our observational studies with the aim of assisting in the theoretical understanding of the corona's apparent relationships to the Sun's X-ray and ultraviolet output. *Subject Headings: 1. Solar energy variation measurement 2. Indirect measurement of solar emission.—Author's abstract.*

12.2-320

551.521.17

*†Sekihara, K. (*Met. Research Inst., Tokyo*), On the effect of multiple scattering to the angular distribution of ultraviolet sky radiation. *Meteorological Society of Japan, Tokyo, Journal*, Ser. 2, 33(4):153-163, Sept. 1955. 4 figs., 6 tables, 28 refs., 20 eqs. In Japanese; English summary p. 153. **DWB, DLC**—Scattered light intensities as calculated by the author's method (in which primary and secondary scattering are considered) are compared with observed intensities, showing good agreement in the visible region but errors greater than 10% in the ultraviolet region, especially at large zenith angles. *Subject Headings: 1. Ultraviolet radiation distribution 2. Multiple scattering.—G.T.*

12.2-321

551.521.18

Fleischer, Richard, **Registrierung der Infrarotstrahlungsströme der Atmosphäre und des Erdbodens.** [Recording of the long wave radiation flux between the atmosphere and surface of the earth.] *Annalen der Meteorologie*, Hamburg, 8(3/4):115-123, 1957. 10 figs., 2 tables, 6 refs. **DWB, DLC**—The radiation balance, Q , is determined by the global radiation ($S+H$), its reflection at the ground, R , the atmospheric counter radiation, A , and the long wave radiation of the ground, E , so that $Q=(S+H-R)-(E-A)$. The author analyzes the annual variation of the radiation balance and of its individual components with special reference to Hamburg; the radiation balance is a function of its short wave components and its long wave components. During the summer months the short wave radiation flux influences the magnitude of the radiation balance to such a degree that the magnitude of the radiation balance can, within certain limits, be determined from the global radiation. In the winter months the short wave radiation flux completely loses this importance, yet the radiation balance cannot be derived from the long wave radiation flux. These simply determine the sign of the radiation balance during the winter. Graphs and tables are presented showing the annual variation of the radiation balance and of its components for Hamburg during 1954-1955, radiation balance as a function of global radiation, $Q/S+H$ in per cent of intraterrestrial radiation intensity for each month, $E-A/S+H-R$, giving the inclination angle (X) defined by (monthly total $(E-A)$ /monthly total $(S+H-R)$), $(E-A)_{\max}$ in cal/cm/d, etc. *Subject Headings: 1. Radiation balance 2. Infrared radiation 3. Hamburg, Germany.—I.L.D.*

12.2-322

551.521.18

†*Shaw, John H., **Infrared studies of the atmosphere.** Ohio. State Univ. Research Foundation, Contract AF 19(122)-65, Final Report, May 16, 1949-Dec. 31, 1954. pub. Dec. 31, 1954. 71 p. figs., tables, refs., eqs. Also: Shaw, J. H., Burch, D. E. et al., **Infrared studies of the atmosphere, 1954-1957.** Its Contract AF 19(604)-1003, Final Report, Jan. 1958. 44 p. 9 figs., 3 tables, 26 refs. **DWB.** Appended: Reprints of articles from various sources (all abstracted separately): Shaw, J. H.; Burch, D. E.; Sloan, R. W. and Williams, Dudley: The emission spectrum of the earth's atmosphere from 4μ to 22μ . Burch, Darrell E.: Infrared evidence for the presence of ozone in the lower atmosphere. Sloan, Raymond; Shaw, John H. and Williams, Dudley: Thermal radiation from the atmosphere. Shaw, J. H.: Nitric oxide fundamental. Burch, D. E. and Shaw, J. H.: Infrared emission spectra of the atmosphere between 14.5μ and 22.5μ . Birkeland, J. W.; Burch, D. E. and Shaw, J. H.: Some comments on two articles by Taylor and Yates. Coburn, Theodore J.; Narahari Rao, K.

and Nielsen, H. H.: **Combination band $\gamma_4 + \gamma_5$ of acetylene.** Rossmann, Kurt; Narahari Rao, K.; France, W. L. and Nielsen, Harald H.: **Infrared spectrum and molecular constants of carbon dioxide, Pt. 1-2.** Sloan, Raymond; Shaw, John H. and Williams, Dudley: **Infrared emission spectrum of the atmosphere** (see 7.2-158). DWB (M21.6 O37s)—The first paper is a summary of the important findings contained in 8 progress reports and 13 scientific papers published in technical journals (listed in appendix) between May 1949 and Dec. 31, 1954. The work consisted in mapping the region from 3 to 13 involving over 1600 absorption lines, 70% of which are found in the atmosphere (H_2O , CO_2 , O_3 , N_2O , CO , CH_4 and HDO). The amount of CO in the atmosphere was determined in detail. Separate chapters discuss: 1) the infrared solar spectrum, 2) upper limits of atmospheric gases, 3) the O_3 molecule, 4) nitric oxide fundamental, 5) absorption bands of N_2O near 4.5, 6) variations in abundance of CO in atmosphere, 7) investigations of absorption by single lines, 8) thermal emission by the earth's atmosphere, 9) scattering of near infrared solar radiation by atmosphere, 10) absorption measurements with a long absorption cell. In the second paper a description is given of the 3-year program of investigating the atmosphere and atmospheric gases by infrared techniques. The major headings of the studies completed under the Contract AF 19(604)-1003 are discussed in the following order: high-resolution studies of infrared molecular bands; the infrared solar spectra (SHAW, CUMMINS); the infrared emission spectrum of the atmosphere; the abundances of atmospheric gases; the intensities and widths of CO lines; the radiation intensity from a point source in a semi-infinite medium; the mean-infrared spectrum of Mars; the apparatus for high-resolution infrared studies. In this material the variations in abundance of atmospheric CO and N_2O at ground level have been studied. High-resolution spectra of bands of CO_2 , O_3 , N_2O , NO , C_2H_2 and NH_3 have been analyzed. Measurements of the growth of single lines of CO have been made, and investigations of the emission spectrum of the earth's atmosphere in the region 4μ to 22μ and of the spectrum of Mars in the PbS region have been undertaken. *Subject Headings:* 1. Infrared spectrum 2. Infrared spectroscopy. I. Williams, Dudley II. Nielsen, H. H.—M.R. and N.N.

12.2-323

Deirmendjian, Diran, **Theory of the solar aureole, Pt. 2, Applications to atmospheric models.** Rand Corporation, Santa Monica, Calif., Research Memorandum, RM-2133, Feb. 20, 1958. 58 p. 12 figs., 3 tables, 18 refs., 21 eqs. (For Pt. 1, see 9.11-296.) DWB (507.2 R186r)—In Pt. 2, the equation is solved in a first approximation, and the component skylight is obtained. A few simple aerosol models are discussed; their general characteristics are similar to those of natural aerosols in number, density, size distribution, and stratification of particles. Theoretical results agree with existing observations as to brightness gradient, spectrum, and some polarization features. A careful analysis of good aerosol data is concluded to be one of the most sensitive tools of research in the investigation of atmospheric turbidity at all levels. *Subject Heading:* 1. Solar aureole theories.—N.N.

551.521.3:551.593.63

12.2-324

Hinzpeter, Hans, **Die effektive Ausstrahlung und ihre Abhängigkeit von den Absorptionseigenschaften im Fenster der Wasserdampfbänder.** [Effective upward radiation and its dependence on the absorption properties in the water vapor window.] *Zeitschrift für Meteorologie*, Berlin, 11 (10/11):321-329, Oct./Nov. 1957. 8 figs., 22 refs., 6 eqs. DWB, DLC—Effective radiation is defined as the long wave energy balance of a flat surface, i.e., the difference between the long wave radiation of the body corresponding to its temperature and the so-called counterradiation of the atmosphere. In determining the dependence of effective radiation upon the absorption properties of water vapor, measurements of effective radiation against different zenith distances were used, since the spectrum of counterradiation cannot be recorded directly. Formulas for computing counterradiation are presented and by means of them the functional dependence of counterradiation, or effective radiation upon various factors in the atmosphere, water vapor, carbon dioxide and ozone is determined. These comprise the formula of YAMAMOTO, namely

551.521.3:551.571

$$G_{\lambda}(0, \xi) = S_{\lambda}(0) - e^{k'_{\lambda}} S_{\lambda}(0) \left[1 + \frac{c_2 \gamma}{\lambda n T_0^2} \{ Ei(k'_{\lambda}) - 2.31 \log k'_{\lambda} - 0.577 \} \right].$$

(S_λ = black body radiation according to the Planck function for wave length λ ; T_0 = temperature at the ground, γ = temperature gradient.)

$$G = S_0 \left[\phi \sqrt{c} - \frac{c_2 \gamma}{\lambda n T_0^2} \frac{\sqrt{c}}{2 \sqrt{\gamma}} \phi (\sqrt{2c} - c/2 + e^{-c}) \right]$$

and

$$G = S_0 \{ 1 - [1 - (S_0 - G_1)] [1 - (S_0 - G_2)] \}.$$

And the effective radiation obtained with these formulas with different absorption spectra for given zenith distances are compared with those of actual measurements. The change of effective radiation is very slight according to Fawle's spectrum. The curves of YAMAMOTO and ONISH indicate a too rapid decrease of effective radiation. The curves of ABEL and LANYLAND agree quite well with observations. Also the influence of normal temperature gradients of 0.5–0.7°/100 m. and the dependence of relative transmission upon surface vapor pressure are considered. *Subject Headings:* 1. Effective radiation 2. Absorption by water vapor 3. Temperature gradients.—*I.L.D.*

12.2–325

551.521.3:551.593.54

Walter, H. (*Astronom. Inst. Tubingen Univ.*), **Streulichtintensität grosser spärlicher Partikel.** [Intensity of light scattered by large spherical particles.] *Optik*, Stuttgart, 14(3):130–142, March 1957. tables, 14 refs., eqs. **DLC**—The intensity of light scattered by spherical particles was calculated in the region of back scatter (180°–170°) for particles with a refractive index of 1.33 and for values of α (circumference of the particle's section divided by wave length of the radiation) equals 6, 8, 10, 12, 15, 18, 25, 30, 45, 60, 90, 120, 180 and 250, also for totally reflecting particles with α equals 6, 10, 18, 30 and 60. The results are presented in 3 tables giving Mie coefficients for the totally reflecting particles and intensity functions with real and imaginary components. *Subject Headings:* 1. Light intensities 2. Scattering of light 3. Mie scattering coefficients.—*Transl. of author's abstract.*

12.2–326

551.521.31

*Meyerott, R. E. (*Lockheed Aircraft Corp., Palo Alto, Calif.*), **Absorption coefficient of air from 2000°K to 18,000°K.** (In: **The threshold of space**, ed. by M. Zelikoff. N. Y., Pergamon Press, 1957. p. 259–269. 4 refs., numerous tables). **DLC**—The results of an overlapping line computation are tabulated for the absorption coefficient at 3, 6, 8 and 18 thousand K both for sea level density and 10^{-3} of this density. Primary attention was paid to NO_2 , O^- , O , N , N_2 as well as to free-free transition of electrons. *Subject Headings:* 1. Absorption coefficients 2. Shock waves.—*A.A.*

12.2–327

551.521.32:535.33

Adel, Arthur (*Atmos. Res. Obs.*), **A comparison of the net radiation losses by the earth's surface in the spectral regions 5 MU, 14 MU, and 14 MU–24 MU.** Arizona. State College, Flagstaff, Contract AF 19(604)-2177, Scientific Report HB-3, April 7, 1958. 8 p. 2 figs., 2 tables.—The net radiation loss by the earth's surface (thermocouple receiver) in the spectral region 5 microns–24 microns has been measured on thirty-three occasions. At Flagstaff, Ariz. the energy loss in the region 14 microns–24 microns reaches values in excess of 30% of the energy loss in the region 5 microns–14 microns. *Subject Headings:* 1. Radiation loss 2. Flagstaff, Ariz.—*Author's abstract.*

12.2–328

551.521.326:546.33

Donahue, T. M. (*Univ. of Pittsburgh, Pa.*) and Hunten, D. M. (*Univ. of Saskatchewan, Canada*), **The correction of sodium twilight glow observations.** *Journal of Atmospheric and Terrestrial Physics*, London, 13(1/2):165–166, Dec. 1958. fig., 2 refs. **DLC**—An attempt is made to clear up some confusion caused by the use of different observation methods by DONAHUE (1956) and HUNTEN. Diagrams of the white light scattered by the lower atmosphere and the same including the sodium emission line, as well as a series of equations, demonstrate the corrections obtained. *Subject Headings:* 1. Sodium D line 2. Twilight airglow.—*O.T.*

12.2-329

551.521.14(474.5)

†Matuliavichene, V. I., Al'bedo nekotorykh podstilaiushchikh poverkhnostei Litovskoi SSR. [Albedo of some ground surfaces in Lithuania.] *Lietuvos TSR Mokslų Akademija. Geologijos ir Geografijos Institutas, Moksliniai Pranešimai*, 5:61-69, 1957. 4 figs., 3 tables, 22 refs., eq. DWB—The paper gives the results of albedo measurements in the visible part of a spectrum obtained by a selenium photo-element and the data of general albedo for ten varieties of ground surface in Lithuanian S.S.R. A device for measuring visual albedo of forest is described. *Subject Headings*: 1. Albedo of ground surfaces 2. Lithuanian S.S.R.—*Author's abstract*.

TEMPERATURE

See also: Wind speed-temp. relationships (Schwerdtfeger), 12.2-13; Frost damage to potatoes (Fourré), 12.2-56; Frost warning device (Goll), 12.2-209; Temp. gradient effects (Johnson et al.), 12.2-211; Freezing forecasting (Onikul), 12.2-241; Frost forecasting (Serra), 12.2-242; Turbulent transfer of heat (Businger), 12.2-279; Cooling effect of snow cover, Hungary (Péczeley), 12.2-285; Vertical temp. gradient (Gião), 12.2-290; Vertical temp. distribution (Longley), 12.2-295; Long range temp. forecasting (Kálmán), 12.2-314; Vertical temp. gradient (Sakali, Gagarina), 12.2-316; Radiant energy steady states (Shaffer, Speyer), 12.2-317; Winter temps., Kara Kum (Nechaeva), 12.2-410.

12.2-330

551.524.2/72:551.552(498)

*Sorodoc, C., Explicatia repartitiei in R. P. A. a abaterilor temperaturilor mijlocii ale lunii August 1957 față de temperaturile normale pentru această lună. [Explanation of the mean temperature anomalies in Romania, Aug. 1957.] *Meteorologia Hidrologia și Gospodărirea Apelor*, Bucharest, 3(2/3):25-28, 1958. 3 figs., 5 tables, 5 refs. English resume p. 137. DWB—The aerological soundings made at Bucharest-Baneasa and Cluj have shown that a great deal of the cold air invasions had a reduced depth and at the height of mountain stations the wind blew mostly from the south. *Subject Headings*: 1. Temperature distribution 2. Cold air invasions 3. Wind distribution 4. Romania.—*Author's abstract*.

12.2-331

551.524.3(43) 551.589.1

Hoffmeister, J., Über die Struktur der langjährigen Mitteltemperaturen in Deutschland. [The structure of long-period mean temperatures in Germany.] *Zeitschrift für Meteorologie*, Berlin, 12(11/12):321-327, Nov./Dec. 1958. table, 7 figs. DWB, DLC—As a complementary study to the long-period mean of the monthly and annual mean temperatures of north Germany carried out by VON FICKER, the author carried out a similar study for south Germany using the same interval 1891-1930. The distribution of daily mean temperatures at Stuttgart-Hohenheim and Munich-Invenstadt into temperature classes was investigated. The distribution of temperatures at Stuttgart-Hohenheim and Munich are compared with those at Berlin (central Germany) and Munster (western Germany) for the months January, March, May, July, September and November and for the entire year. The structure of the mean values expressed through the frequency of the daily means according to class values shows four groups among the six localities Stuttgart-Hohenheim, Munich, Trenburg, Berlin, Munster and Westerland. These are as follows: (1) the maritime westerland with slight variation amplitudes, high peak in all months and in the year; (2) Munster with maritime pattern, Berlin with continental pattern, but both extensively similar in the distribution of and in the height of peak value; (3) Stuttgart-Hohenheim and Munich corresponding considerably among themselves but only different in minor points from group 2; during March, April, July, August and September the peaks are lower in the case of approximately similar variation amplitudes; (4) continental Freiburg with large variation amplitude and high peaks at 0°C during the winter months. The distributions are attributable to temperatures of the air masses. These distribution, types of temperature correspond to four regional air mass types when these are characterized by their temperature properties. *Subject Headings*: 1. Temperature distribution 2. Annual temperature variations 3. Mean monthly temperatures 4. Germany.—*I.L.D.*

12.2-332

551.524.3:551.588.2:551.515.8

*Sekiya, H. (*Karuizawa Weather Station*), Local air temperature. *Meteorological Research Notes (Kisho Kenkyu Note)*, Tokyo, 9(2):49-68, June 1958. 41 figs., 10 tables, 17 refs., 11 eqs. In Japanese (title Romanized: *Kyokuchi no kion*). DWB The behavior of local air temperature variations in mountain areas, in basins, in plains immediately before snow fall, and air temperature variations associated with the passing of fronts are discussed with thermodynamic analysis from the available data of various sources. *Subject Headings*: 1. Temperature variations 2. Frontal passage effects 3. Orographic effects on temperature.—J. H. Woo.

12.2-333

551.524.31:519.24(439.1)

Péczeley, György, A hőmérséklet napközi változékonyságának szingularitásai. [Singularities of daily variability of temperature.] *Időjárás*, Budapest, 62(3):147-150, May/June 1958. 2 tables. German summary p. 147. DLC -A statistical analysis of the probabilities of temperature changes from one day to the next in excess of 3°C (advective temperature changes) (Budapest, 1871-1955) reveals that there are 35 significant positive or negative singularities in such probabilities during the year. Five of these are associated with precipitation singularities and consequently are considered to have prognostic usefulness. *Subject Headings*: 1. Diurnal temperature variations 2. Temperature variability 3. Singularities 4. Budapest, Hungary.—G.T.

12.2-334

551.524.3(521.27)

Shinya, M., Frequency distribution of maximum and minimum air temperature in Tokyo, Pt. 1. *Journal of Meteorological Research*, Tokyo, 10(3):237-239, March 1958. 4 figs., 2 tables. In Japanese. DWB, DLC—The statistical investigation of the daily maximum and minimum air temperature in Tokyo was elaborated for the period of 30 years, 1921-1950, with a formula: $T - T_m = VT$ (T =Daily Observation Value, T_m =Annual Value, VT =Variation) and frequency (f) and distorted curve (u) used in figs. Conclusion reached as follows: 1) Standard variation was great in the daily maximum air temperature except in December. 2) Annual change of standard variation was minimum in August and maximum in spring. 3) u sign shows a plus in winter, minus in summer, and zero in spring-autumn. 4) VT changes with standard variation, but minimum VT is irrelevant to standard variation and is constant through the year. *Subject Headings*: 1. Mean maximum and minimum temperature data 2. Temperature frequency distribution 3. Tokyo, Japan.—K.C.

12.2-335

551.524.32:598.2

Il'ichev, V. D., Svoeobraznaia vesna v Bashkirii. [An unusual spring in Bashkir.] *Priroda*, Moscow, No. 5:125-126, May 1958. DWB, DLC—The spring of 1957 in Bashkir was characterized by the most sharp temperature changes in a period of 60 years. This produced changes in the basic vital data among most of the species of birds. The first two months of spring were marked by very low temperatures but adequate precipitation. Sudden warming up began at the end of April; the May temperature near Ufa attained a mean of 19.1°C, a maximum of 32°C and a minimum of 6.8°C. The cold weather in March delayed the departure of wintering birds and the arrival of summer birds. The effect of these temperature changes upon insects and birds is discussed. *Subject Headings*: 1. Cold spring, Bashkir, 1957 2. Temperature drop 3. Temperature effects on birds 4. Bashkir, U.S.S.R.—I.L.D.

12.2-336

551.524.32:576.8:639.215(439.1)

Páskándy, János, Adatok az időjárás és a zooplankton tavaszi szaporodásának ciklusa közötti kapcsolatáról a gödöllői ivatótavakban. [Data on relations between weather and the cycle of propagation of zooplankton in the fish breeding ponds of Gödöllő.] *Időjárás*, Budapest, 63(5):305-306, Sept./Oct. 1959. table, ref. DLC—According to the opinion of some experts, the frequent cooling of May temperatures badly affects the development of the zooplankton which is the main nutrient of the young carps in this period. Experiments conducted in three breeding ponds showed a decrease in the quantity of plankton after the culmination of the cold wave in May 7-9. *Subject Headings*: 1. Annual temperature variations 2. Cold spells 3. Weather effects on zooplankton 4. Fisheries 5. Gödöllő, Hungary.—E.K.

12.2-337

551.524.32(47):581.54

Remizov, G. A., *Sezonnoe razvitiye prirody v mae*. [Seasonal development of nature in May.] *Priroda*, Moscow, No. 5:123-124, May 1958. fig. DWB, DLC—Over a large part of the U.S.S.R. the atmospheric temperature increases most intensely in May, which is the first month of the warm season, except in the Arctic and subtropical regions. Over the entire U.S.S.R. May is in the same year never colder than April or warmer than June. Of all the months of the warm season, May has the most unstable air temperature regime. As a result of differences in the temperature and circulation regimes different parts of the U.S.S.R. are characterized by different plant phenological conditions, which are described with the aid of a map showing the long period mean seasonal development of nature on May 15 and isolines of developmental stages of various plants. *Subject Headings*: 1. Seasonal temperature distribution 2. U.S.S.R.—I.L.D.

12.2-338

551.524.33:517.512.2(494.42)

Bouvier, P., *Périodicités dans la série des températures moyennes annuelles*. [Periodicities in the series of annual mean temperatures.] *Genève. Observatoire, Publications, Ser. M*, No. 34, 1960. 6 p. 2 figs., 7 refs. DLC—The statement of a method for analyzing the periodicities and application of this method to the annual mean temperatures in Geneva for the period 1826-1959, with a view to find certain climatic cycles. The assumed periods obtained are of 8, 11, 13 and 16 years. The 11-year period corresponds obviously to the solar cycle and the 8- and 16-year periods are perhaps those of harmonics of a cycle set forth by BRUCKNER and are in the order of 32 to 36 years. As to the 13-year period, the most important to judge by the diagram of fig. 1, it is not bound to any known cycle. *Subject Headings*: 1. Temperature periodicities 2. Annual temperatures 3. Geneva, Switzerland.—A.V.

12.2-339

551.524.33:523.746(434)

Fischer, Rudolf (*Darmstadt*), *Perioden warmer, kühler Juli und Sonnenfleckenextreme*. [Periods of warm and cool Julies and extremes of solar flares.] *Naturwissenschaftliche Rundschau*, Stuttgart, 11(12):470, Dec. 1958. DWB, DLC—Very brief discussion of the tabulation of mean July temperatures at Frankfurt a.M. 1827-1958 indicating a correlation between the apparent 5, 6, and 7-year periodicity if warm and cold extremes with sunspot extremes to occur 1-2½ years later. Minimum and maximum of sunspots during this 130-year period are listed. *Subject Headings*: 1. Solar flare effects on temperature 2. Seasonal temperature distribution 3. Frankfurt a.M., Germany.—W.N.

12.2-340

551.524.37:551.579.2(71)

Fraser, J. Keith (*Northern Canada Res. Sec., Geographical Branch, Ottawa*), *Freeze-thaw frequencies and mechanical weathering in Canada*. *Arctic*, Montreal, 12(1):40-53, March 1959. 6 figs., 2 tables, 20 refs. DLC—Frost-riven rock is more evident in northern than in southern Canada but this is not as a result of lower temperatures or the freeze-thaw frequency. The author outlines some of the climatic factors that are responsible for the presence of such a rock. Conclusions have been drawn from a study of the records from two Canadian stations. *Subject Headings*: 1. Temperature frequencies 2. Freezing temperatures 3. Thaws 4. Canada.—N.N.

12.2-341

551.524.72:551.557.2

Strachan, R. A., *A proposed model for height change patterns in three dimensions and allied phenomena: the temperature field*. *Canada. Meteorological Branch, CIR-3098*; TEC-281, Sept. 17, 1958. 6 p. 12 figs., 5 refs. DWB, DLC. Also his: *A proposed model for height change patterns in three dimensions, and allied phenomena: the wind field*. *Ibid.*, CIR-3099; TEC-282, Sept. 17, 1958. 10 p. 12 figs., 6 refs. DWB, DLC—Three-dimensional patterns of height changes in the 500-200 mb stratum are examined theoretically and synoptically with respect to the temperature field. The proposed model is concerned with the behavior of these phenomena in relation to moving waves whose amplitude may vary in space and time but always exhibit a maximum in the 500 to 200 mb stratum. Synoptic and prognostic inference are supported by examples which are intended to illustrate the plausibility of the model. *Subject Headings*: 1. Three-dimensional height change patterns 2. Upper air temperatures 3. Upper air winds.—*Author's abstract*.

SOIL TEMPERATURE

See: **Heat flow in earth** (Schössler, Schwarzlose), 12.2 143; **Soil temp. gradient** (Jobert, Le Mouél), 12.2-148.

WATER TEMPERATURE

See: **Ocean temp. data, Sea of Japan** (Hishida), 12.2-153.

PRESSURE AND WIND

PRESSURE

See also: **Winds and pressures in hurricanes** (Gilman, Myers), 12.2-84; **Tides** (Groves), 12.2-113; **Advection effects on pressure** (Kagan), 12.2-280; **Movement of cold centers, Carpathian Basin** (Kálman), 12.2-314; **Geostrophic wind field** (Williams), 12.2-362; **Wind height determination using 100-500 mb thickness** (Staver), 12.2-363.

12.2-342

551.515.2:551.508.43:551.547.1

*Gherzi, E., **Altimeter readings in stormy weather.** *Bulletin de Géophysique*, Montreal, No. 4:3-13, Nov. 1958. 2 tables, 5 refs. French summary p. 3. **DWB**—Erratic behavior of aneroid altimeters have been fatal to stormy weather air flights, hence a "safety local correction" is extremely important as is shown in this discussion. Analytical results of checking hundreds of weather maps and the 500 mb level, including specific studies of extratropical and tropical cyclones show a different mean variation of the height of the 500 mb than that given in the U. S. Weather Bureau's tables. The difference between a 500 mb determined and the radiosonde value on a U. S. Weather Bureau map, featuring an extratropical cyclone, is the correction to be considered for addition in similar weather conditions. Tabulated examples of this "safety local correction" are given for tropical cyclones and for extratropical cyclones over oceans and over continents. A tabulated compilation of 10-year series of mb surface for 60 North American radiosonde stations listed, serves to amplify the precautionary measure of an air-pilot to act as if he were about 2000 ft lower than indicated by the aneroid altimeter within stormy weather areas. *Subject Headings:* 1. **Altimeter corrections** 2. **Aneroid altimeters** 3. **Cyclone effects on altimeter readings.**—W.N.

WIND

See: **Wind speed-temp. relationships** (Schwerdtfeger), 12.2-13.

TURBULENCE

See also: **Gust data** (Copp, Fetner), 12.2-39; **Turbulent transfer of momentum** (Businger), 12.2-279; **Shear waves in rotating liquids** (Lowell), 12.2-281; **Turbulence spectrum** (Ohji), 12.2-282.

12.2-343

551.551:551.501.45:519.241.6

Jones, J. I. P. and Pasquill, F. (both, *Met. Office, Porton Down, Wilts.*), **An experimental system for directly recording statistics of the intensity of atmospheric turbulence.** *Royal Meteorological Society, Quarterly Journal*, 85(365):225-236, July 1959. 6 figs., 4 tables, 8 refs., 6 eqs. **DWB, DLC**—It is demonstrated theoretically that the 'filtering' effects exerted on a turbulence record by taking averages over an interval s , for a total sampling time τ , may be reproduced by simple electrical filters as far as the variance is concerned. The smoothed rectified output of such a filter may be recorded on a slowly moving chart, and with the further assumption of Gaussian distribution in the amplitudes of the fluctuations, may be read directly as a statistical mean of the standard deviation. A description is given of an experimental system, and of direct tests of its performance in recording the standard deviation of wind-direction fluctuations when averaged over 5 sec and sampled over 3 min. Proposed applications are briefly outlined. *Subject Headings:* 1. **Turbulence intensity direct recording** 2. **Standard deviation of wind direction fluctuations** 3. **Filtering.**—Authors' abstract.

12.2-344

551.551.25

Tick, Leo J., **Analysis of wind structure, Phase 3, Mathematical analysis of turbulent structure.** N. Y. Univ. College of Engineering. Research Div., Contract D.A-36-039 SC-78091, Third Quarterly Progress Report, March 1-May 31, 1959. 16 p. 9 eqs. DWB (M(051) N532an)—An elementary description is given of the conditioning procedure and its use to set up a simple atmospheric turbulence model which includes ground effect. In terms of a particular asymptotic spectrum, as given in the Second Quarterly Report, the equation of the spectrum for all heights is given. Difficulties in making numerical evaluation of the integral are discussed. A description of a simple study of the effect of firing angle on dispersion is given. The need for computing of rocket transfer function is described. *Subject Headings:* 1. Wind structure 2. Turbulence structure.—*Author's abstract.*

12.2-345

551.551.5

Dugstad, Ivar, **Clear-air turbulence and bumpiness.** (In: Saucier, W. J. et al., **Wind field near the tropopause.** Texas A. & M. College. Dept. of Oceanography & Meteorology, Contract AF 19(604)-1565, Final Report, Dec. 1958. p. 58-74. 4 figs., 13 refs., 21 eqs. DWB —Three different approaches are made to the problem of clear-air turbulence. In the first, criteria for turbulence are studied as determined from the conditions required on the real value of mixing length, which show the relation between horizontal shear, curvature and deviation angle. In the second, estimation of energy dissipation rate is made by assuming an "isotropy" condition on clear-air turbulence and "anisotropy" conditions on the mean flow. In the last section, prognostic equations for clear-air turbulence are presented. *Subject Heading:* 1. Clear air turbulence.—*Author's abstract.*

12.2-346

551.551.5:551.510.42:533.15

*Record, Frank A. and Cramer, Harrison E. (both, Mass. Inst. of Tech., Round Hill Field Station, S. Dartmouth, Mass.), **Preliminary analysis of Project Prairie Grass diffusion measurements.** Air Pollution Control Association, Journal, 8(3):240-248, Nov. 1958. 10 figs., 6 tables, 10 refs. DWB, DLC. Also issued in Air Pollution Control Association, Proceedings, Vol. 50, 1957. Issued 1958? Paper No. 17 (10 p.). DWB (M10.42 A298ap) —The Massachusetts Institute of Technology has made measurements of average gas concentrations over a range of 800 m, and of certain meteorological parameters associated with the structure of turbulence. This report is a preliminary analysis of the observations. It briefly describes the conduct of the diffusion experiments; summarizes the basic features of plume structure and behavior thus observed; discusses the empirical relations between diffusion and 2 simple meteorological parameters—the standard deviation of azimuth wind direction and the stability ratio. *Subject Headings:* 1. Turbulence structure 2. Diffusion of gases.—*N.N.*

12.2-347

551.551.5:532.517.4

Weiller, A. R., **De la variation du coefficient de viscosité cinématique turbulente avec l'altitude.** [Variation of the turbulent viscosity coefficient with height.] *Journal Scientifique de la Météorologie*, Paris, 8(31):99-105, July/Sept. 1956. 3 figs., eqs. French, English and Spanish summaries p. 99. DLC—On the average the surface wind is half as strong as the geostrophic wind. This appears to confirm the widely accepted opinion that the turbulent viscosity coefficient varies with altitude. *Subject Heading:* 1. Eddy viscosity variation with height.—*Author's abstract.*

12.2-348

551.551.8:551.510.42:628.53

*Diem, Max and Trappenberg, Rüdiger (both, Met. Inst. Technische Hochschule, Karlsruhe), **Berechnung der Ausbreitung von Staub und Gas.** [Calculation of the diffusion of dust and gas.] *Nordrhein-Westfalen, Germany. Wirtschafts- und Verkehrsministerium, Forschungsberichte*, No. 502, 1957. 16 p. 67 graphs, table, 5 refs., 9 eqs. DWB (M10.42 D561be)—This study was conducted on behalf of the professional group on dust technology of the Association of German Engineers, in order to check distribution of gases and particles coming from furnaces and smokestacks of the increasing industrialization. The results are presented in a compilation of curves enabling forecasts of the gas and dust conditions at the ground under almost any atmospheric condition. Local topography and uncertainty of wind dis-

tribution and exchange with height are limitations to consider when the curves are to be used. *Subject Headings:* 1. Atmospheric pollution 2. Diffusion of gases 3. Turbulence calculations. —W.N.

WIND DISTRIBUTION AND VARIATION

See also: Surface wind (Thomas), 12.2 35; Sea breeze effect on fire weather (Coffin), 12.2-66; Air flow over mountains (Guniia), 12.2-288; Wind distribution, Romania (Sorodoc), 12.2-330; Settling drops from an air current (Amelin, Beliakov), 12.2-375.

12.2-349

551.553:551.43

Förchtgott, J., *Deformatsiia na vüzdušnite techeniia v podvetrenata strana na planinskie grebeni*. [Deformation of air flow on the lee side of mountain ridges.] *Khidrologiia i Meteorologiia*, Sofia, No. 1:9-13, 1958. 5 figs. Russian and English summaries p. 13. **DLC**—Various types of air currents deformed by mountain obstacles are discussed on the basis of extensive observations. The physical and synoptic conditions for the formation of these currents are described as well as the mechanisms of the attending phenomena. The conditions for flying by motor and motorless aircraft at various heights in the deformed currents are likewise described. *Subject Headings:* 1. Air flow deformation 2. Air flow around mountains. —*Author's abstract*.

12.2-350

551.553:551.588.2:532.5

Long, Robert R. (*Johns Hopkins Univ., Baltimore, Md.*), **A laboratory model of air flow over the Sierra Nevada Mountains**. (In: Bolin, Bert (ed.), *The atmosphere and the sea in motion*. N. Y., Rockefeller Institute Press, 1959. p. 372-380. 12 figs., 8 refs., 8 eqs.) **DLC**—A description is given of a liquid model of the flow of air over the Sierra Nevada Mountains in the vicinity of Bishop, Calif. A theoretical discussion indicates that the modeling can be attempted by requiring geometric similarity of the boundaries in the fluid systems and equality of the internal Froude numbers, suitably defined. The experimental model has flow patterns that resemble the prototype quite closely although in some cases at somewhat different internal Froude numbers. *Subject Headings:* 1. Air flow over mountains 2. Orographic effects on wind 3. Sierra Nevada Mountains.—*Author's abstract*.

12.2-351

551.553:551.558.21

Vítek, Vojtěch, **Poznamky k teorii vírového proudění v závětrí hor**. [Notes on the theory of eddy currents in the lee of mountains.] *Meteorologické Zprávy*, Prague, 12(5):110-112, 1959. 2 refs., 13 eqs. Czech., Russian and English summaries p. 110. **DWB, DLC**—Notes on the theory of eddy currents in the lee of mountains. A hydrodynamical method described earlier is somewhat modified and applied to the single station lee-vortex. *Subject Headings:* 1. Lee eddies 2. Eddy currents.—*Author's abstract*.

12.2-352

551.553.12

Davidson, Ben, **Investigation of theoretical and observational aspects of valley winds**. N. Y. Univ. College of Engineering. Research Div. Dept. of Meteorology and Oceanography, Contract DA-36-039-Sc-78091, Phase 1, Quarterly Progress Report No. 1 (i.e. No. 2), Jan. 1-March 31, 1959. 5 p. 7 eqs. Also: Quarterly Progress Report, No. 3, *Ibid.*, April 1-June 30, 1959. 3 p. **DWB** (M(051) N532a)—In Report No. 1 (i.e. No. 2), formal solution of the heat conduction equation for a V-shaped valley is given. Theoretically, the solution for the slope wind system resulting from this temperature distribution may also be obtained from simplified equations of motion. The solutions are quite complicated and difficult to evaluate explicitly. Work on dimensional analysis of night-time valley winds is briefly summarized. *Subject Heading:* 1. Valley winds.—*Author's abstract*.

VERTICAL DISTRIBUTION

See: Shear waves in rotating liquids (Lowell), 12.2-281.

SPECIAL WINDS

See also: **Föhn effects, Lithuania** (Buz), 12.2-355; **Underground winds in Finnish eskers** (Troll), 12.2-408.

12.2-353

551.555:001.4

Rodewald, Martin, **Kleines ABC besonderer Winde**. [Small ABC of special winds.] *Wetterloste*, Hamburg, No. 141:4-10, Jan. 1959. DWB—The 52 meteorological terms in alphabetical order include wind and weather terms particularly useful in marine meteorology. All terms are explained in simple language. *Subject Headings*: 1. Special winds 2. Meteorological terminology.—W.N.

12.2-354

551.555.6:551.578.4

Gold, Michael J. E., **Three months of snow, ice and blizzards**. *Weather*, London, 14(3): 98-100, March 1959. "Reprinted from the *Coleshill Chronicle*." DWB, DLC—The severe 1946-47 winter in Warwickshire as recorded in the diary of a 15-year old farm boy shows that the intermittent snowfalls, Jan. 6-April 2, resulted in 5-6 ft deep snow drifts caused by blizzards. Temperature ranged from 22°F to -2°F. Rain began March 10 and the spring flood climaxed on March 14. *Subject Headings*: 1. Blizzards 2. Snow data 3. Coleshill, Eng.—W.N.

WIND EFFECTS

See also: 12.2-43; Sec. B8, p. 244; **Wind utilization**, 12.2-42, 12.2-43; **Wind effects on water surfaces** (Ichiye), 12.2-154; **Wind effects on tides, Lake Okeechobee** (Farrer), 12.2-176; **Wind effects on drift ice** (Sawada), 12.2-193; **Wind effects on waves** (Reid), 12.2-303; **Wind effects on cumulus formation** (Braham, Draginis), 12.2-388.

12.2-355

551.556:551.553.3(474.5)

Buz, A. I., **Fenovyĭ effekt nad territoriei Litvy**. [Föhn effect over Lithuania.] *Lietuvos TSR Mokslų Akademija. Geologijos ir Geografijos Institutas, Moksliniai Pranešimai*, Vol. 3 *Geofizika, Hidrologija*, issued Vilna, 1956. p. 11-19. fig., 6 tables, 3 refs., eqs.—The surface of Lithuania is a hilly plain dissected by numerous rivers and plains. In order to determine the föhn effect in an undistorted manner, i.e., change in the weather elements as a result of the forced rise and descent of air masses when flowing across elevations, it was necessary to observe uniformly directed flow with a velocity of at least 5 met/sec. The weather at all stations had to be homogeneous when the variations of the meteorological elements were studied for short time intervals. During easterly transport the föhn effect is more pronounced than during westerly transport. This is a consequence of the sea effect, since the advection of marine air masses alters sharply the readings of marine stations. Change in the amount of precipitation during ascending and descending air mass motion on windward and lee slopes is more marked in summer than in winter. During winter increased amounts of precipitation occur on the lee side of slopes when snow falls; this occurs always when strong winds with a horizontal transport of precipitation (snow) prevail. Four examples illustrating the change in meteorological elements as a result of the ascent and descent of air masses over irregularities of surface relief are presented. *Subject Headings*: 1. Föhn effects 2. Föhn analysis 3. Lithuanian S.S.R.—I.L.D.

12.2-356

551.556.1:551.464:621.315.2(52)

Hayakawa, M., **On the salty wind damage to power cables in Niigata Prefecture**, Pt. 1. *Japan. Meteorological Agency. Tokyo, Memoirs of Industrial Meteorology*, 22(1):39-42, 1958. 2 figs., 4 refs. In Japanese; English summary p. 42. DLC—Occurrence of great damage by salty wind to power cables in Niigata Prefecture is restricted in the time of typhoon passage. Salty wind damages to insulators by Typhoon No. 15 in 1954 and by Typhoon No. 22 in 1955 are especially mentioned in the records of the Niigata Branch of the Tohoku Power Distribution Company. Since these two cases are considered to be representative of salty wind damage to insulators in Niigata Prefecture, the author has investigated weather conditions in relation to the salty wind damage. Obtained results are as follows: 1. Wind speeds enough to transport much salt towards inland is above 18 m/sec at the coast. 2. Relations of "short circuit phe-

nomenon of insulators by salty splashes" to rainfall amount and humidity are: i) For causing the "washing effect," it is necessary that a rainfall of the amount above 0.2 mm/min continues for an adequate time. ii) Even though there is no rainfall, humidity exceeding 80% may cause the short circuit. *Subject Headings:* 1. Wind damage to power lines 2. Salt spray 3. Cables 3. Niigata Prefecture, Japan.—*Author's abstract.*

12.2-357

551.556.4:551.311.3:678.555

Ludwig, Gerhard (*Berlin-Oberschöneeweide, Parsevalstr. 2-4*), **Über die Anfärbung rezenter Sande mit lumineszierenden Stoffen zum Erkennen ihrer Transportwege.** [Dyeing of recent sand with luminescent matter for studying its transport.] *Acta Hydrophysica*, Berlin, 5(3): 152-157, 1959. fig., table, 4 refs. German summary p. 152. **DLC**—The author describes a method of coloring sand in order to study the movement of alluvial sands. The principle of this method consists of binding a luminescent color to finely powdered sand grains by means of a very thin colloidal film. After summarizing the technique developed by V. P. ZENKOVITCH in the Soviet Union the author describes the method which he himself employs to obtain colored sand. In addition to anthracene the author used other highly condensed carbohydrates from anthracite, such as tetracene, phenanthrene, benzpyrene, etc. Colloid films were made out of the following mixtures: agar-agar, bone lime, starch and gelatin. The application of the colloids and coloring substances to the sand grains is described. It was found that colloid films of agar-agar and agar+agar+bone lime are most constant. Anthracene (bright green blue), benzpyrene (bright green) and "coronen" (soft green) have the most intense luminescent colors and are suitable for coloring the smallest sand grains. The luminescence of tetracene (orange) and phenanthrene (violet blue) is less intense and is suitable for grains >0.3 mm. *Subject Headings:* 1. Sand transport 2. Wind effects on sand movement 3. Plastics.—*I.L.D.*

12.2-358

551.556.4:551.311.3

Roberts, Edd and Bunch, Clarence E., **Wind erosion in Oklahoma.** *Oklahoma Univ., Circular E-667m (1958?)*. 16 p. photos. **DWB** (551.37 R643wi)—A popular pamphlet outlining and illustrating facts about wind erosion in Oklahoma and accompanying depletion of soil, and methods of prevention by cropping, stripping, reduction of wind speed, and "cloddy" or rough tillage. Soil must first of all be dry, then loose, and then winds of 30-70 mph will raise the soil. Most favorable season is winter and spring and least in summer when vegetation is heavy. The western 18 counties of Oklahoma are the most favorable for wind erosion, but it occurs in places in East Oklahoma as well. Sandy soil areas are worst and places where peanuts are raised, are all subject to wind erosion. *Subject Headings:* 1. Wind erosion 2. Oklahoma.—*M.R.*

12.2-359

551.556.8:551.481.1

551.556.4:551.311.31

Dussart, B.; Juget, J. and Sitarz, J., **Les sables des dunes lémaniques, conditions de transport, nature.** [The sands of the Lemanian sand-hills, transport conditions, nature.] *Archives des Sciences*, Geneva, 12(1):1-8, 1959. 3 figs., 2 tables. **DLC**—The formation process of the typical sand-hills of Lake Lemman (Sciez-Excenevex) is due to the transport, first in water and then in the air, of sand particles. The formation of the sand-hills is due to the alternate action of NE and NW swells causing the formation of offshore bars which, immersed at the time of high waters (summer) are driven to the shore in winter. The sand is then raised by the wind which transports it and forms very characteristic dunes. The swells have an average amplitude of 0.30 m to 0.50 m; the highest may exceed 1.20 m. Their duration does not exceed from some hours (NW swells) to some days (NE swells). The nature of the sand has been characterized by its mean granulometry and its content in minerals soluble in hydrochloric acid. The horizontal distribution of the sand in the Sciez Bay of Leman Lake has been taken up. *Subject Headings:* 1. Sand dune formation 2. Swell 3. Wind effects on lake levels 4. Sand dune-wind relationships 5. Leman Lake, Switzerland.—*A.V.*

12.2-360

551.556.8:551.465

Francis, John Robert Dark (*Imperial Coll. Scien. and Technology*), **Wind action on a water surface.** *Institution of Civil Engineers, London, Proceedings*, 12:197-216, Feb. 1958. 4 figs.,

5 tables, 36 refs., 3 eqs. **DLC**—Wind blowing over water creates a tangential shear stress on the interface, causing an upward slope in a downwind direction, a drift current and waves. The problems involved in finding shear stress are discussed, and the numerical values obtained in many experiments are reviewed. The shear-stress coefficient seems to rise with increasing wind-speed, but becomes nearly constant at wind-speeds of more than 30 knots. The information on drift currents proves to be meagre, but a surface velocity of about 1/30 wind-speed seems to be generally accepted. Estimation of wave measurements proves to be far more difficult than estimation of shear stress, since there is no satisfactory theory for the generation of waves by wind. Several attempts have been made to collect wave measurements and to express them as functions of wind-speed and fetch. There are wide differences between the predictions of each method, as well as a wide scatter of observations about the mean lines of the functions relating waves, wind and fetch. There are similarly several methods of estimating the height of swell waves produced by a far distant storm. The unsatisfactory nature of present knowledge of wave generation calls for more measurements, which, however, must be more accurate and complex than heretofore. *Subject Headings: 1. Wind effects on water surfaces 2. Tangential wind stress 3. Shear stress 4. Wave generation.*—*Author's abstract.*

12.2-361

551.556.8:532.593(261.2)(262.5)

Khvan, A. P., **Pole vetrovykh voln na melkovodnom ozero.** [Field of wind waves in a shallow lake.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 10:1202-1210, Oct. 1958. 5 figs., 6 refs., 37 eqs. **DLC.** Transl. into English in the corresponding number of the *Akademiia Nauk SSSR, Geophysics Series.* **DLC**—A formula for computing the "scale sections" of distance and time in the wind wave field in shallow waters is developed. The relationship between energy lost by waves in shallow water as a result of their partial destruction, and the energy expended in overcoming internal friction is determined from the equation of energy balance. The derivation of formulas for determining the scale sections of time and distance is presented; these are respectively:

$$\frac{t}{\tau} = \frac{T_2}{(V-c)} \sqrt{\left(\frac{R}{x}\right)^2 \frac{\delta}{\delta_a} \frac{gH}{\pi \epsilon x}}$$

and

$$\frac{x}{\xi} = \frac{5}{4\sqrt{2}} \left(\frac{\delta}{\delta_a}\right)^{\frac{1}{2}} \left(\frac{R}{r}\right)^{\frac{3}{2}} \left(\frac{g}{\pi \epsilon}\right)^{\frac{3}{2}} \frac{H_1^{\frac{3}{2}} \left(1 + \frac{H}{H_1}\right)}{x^{\frac{1}{2}} (V-c)^{\frac{3}{2}}} T_2$$

($R=\lambda/2\pi$, H =depth of sea, λ =length of wave, T =period, r =half height of wave, δ_a =density of air, $(V=c)$ =relative wind velocity, x and ϵ =coefficients, the computation of which is illustrated). The application of these formulas to the Black and North Seas is illustrated. *Subject Headings: 1. Wind wave equations 2. Wind field in shallow lakes.*—*I.L.D.*

UPPER AIR WINDS

See also: **Orographic effects on upper air flow** (Guniiia), 12.2-288; **Jet stream research** (Koppány), 12.2-292; **Jet stream winds** (Kravchenko), 12.2-294; **Jet stream effects on climate** (Trewartha), 12.2-399; **Jet stream effects on visibility, Ligurian Sea** (Bosso-lasco, Cicconi), 12.2-414.

12.2-362

551.557.2:551.547.5

Williams, Nolan Patrick, **A method of analysis of surface geostrophic winds in mountainous regions.** *Washington (State). Univ. Dept. of Meteorology and Climatology*, Contract AF 19(604)-3063, Scientific Report No. 6, Aug. 1959. 46 p. 14 figs., 6 tables, 7 refs. **DWB**—Fictitious pressure gradients appear on sea-level charts in mountainous regions as a result of the reduction of the barometer to sea level and because of the ability of mountain barriers to sustain large pressure differences between stations on opposite sides. These fictitious pressure gradients limit the usefulness of the sea-level isobars in depicting the surface air flow.

Moreover, local effects often make the actual surface winds nonrepresentative. It is, therefore, desirable to devise some method of representing the air flow over mountainous terrain that will serve the same function as isobaric analysis in flat regions. In the present study constant pressure charts were analyzed at 50-mb intervals between 950 mb and 750 mb, the height contours being terminated where they intersected solid ground. At these intersections of the pressure surfaces with the earth's surface, geostrophic winds were measured, plotted on a base map, and analyzed by means of streamlines and isotachs. These gave what may be termed the "true" surface geostrophic wind field, and for the case studied this field proved very different from the geostrophic wind field corresponding to the sea-level isobars. This case dealt with an example of a large fictitious gradient over the mountains of western Canada and Alaska. The tedious process involved in obtaining the "true" surface geostrophic wind is not suited to practical use so that an attempt was made next to combine routine analyses in such a way that they yielded an equivalent result. The combination of the surface and 850 mb charts was found to give a satisfactory representation in most areas, though it was necessary to make use of the 700 mb chart in the vicinity of the St. Elias Range. Apparently for certain types of flow, the barrier effect extends well above the mean height of the topography. *Subject Headings: 1. Surface wind analysis 2. Geostrophic wind field.*—*Author's abstract.*

12.2-363

551.557.36:551.547.5

Staver, Allen E., **Determining the height of the maximum wind and using the 100-500 millibar thickness.** Dec. 1958. Thesis (M.S.)—New York Univ. College of Engineering. 31 p. incl. illus., 17 refs. Available on loan only from ASTIA as its AD-214 162—Factors determining the height of the maximum wind in the westerlies are discussed and investigated. An empirical graph is derived which gives the height of the maximum wind as a function of 100 to 500 mb thickness, latitude, and season. Turbulent fluctuations in wind speed are shown to possibly account for a large portion of the discrepancies between heights of the maximum wind as obtained from the graph and the height observed. *Subject Headings: 1. Maximum wind height determination 2. 100-500 mb thickness.*—*Author's abstract.*

12.2-364

551.513.2:551.557.5

Bandow, Donald E., **Study of wind variation with time in the vicinity of the jet stream.** Jan. 1959. Thesis (M.S.)—Texas Agri. and Mech. College. 66 p. incl. illus. tables. Available on loan only from ASTIA as its AD-215 198.—A review is given of the literature on wind variation with time. Based on data obtained by a specially instrumented aircraft, vector wind changes in the vicinity of a jet stream are presented over periods of about 70 and 140 min. A mean vector change of 8 kn is found for the shorter interval and 13 kn for the longer one. Larger magnitudes of vector variation in general accompany the stronger wind speeds. *Subject Headings: 1. Jet stream winds 2. Vector mean winds 3. Wind variations.*—*Author's abstract.*

12.2-365

551.513.2:551.557.5

Simla, J., **The relation of the jet stream axis to contour direction.** *Canada. Meteorological Branch, CIR-3018; TEC-264*, Feb. 21, 1958. 11 p. 5 figs., table, 6 refs., 9 eqs. **DLC, DWB**—The effects of acceleration and deceleration on air in motion are incorporated into a useful aid for the location of jet axes at the 300-mb level. The angle of cross contour flow which results from the effects of acceleration and deceleration is calculated for varying isotach spacing along the jet axis and for various latitudes. Some examples of jet-stream analysis are presented and discussed. *Subject Headings: 1. Jet stream location 2. Jet stream analysis.*—*Author's abstract.*

12.2-366

551.557.5:551.515.3:551.509.327

Taylor, Frank J., **The jet stream is the villain.** *Popular Mechanics*, Chicago, 109(4):96-99, 238, 242, April 1958. figs. (incl. photos). **DLC**—The application of jet stream information to tornado forecasting at the Severe Local Storm Forecast Center in Kansas City, Missouri, is explained. The use of jet streams in flight, methods of jet stream observation, geographic distribution of jet streams and hypotheses concerning their origin are discussed. *Subject Headings: 1. Jet stream-tornado relationships 2. Tornado forecasting.*—*G.T.*

VERTICAL MOTION

See also: **Up drafts** (Agésilas), 12.2-41; 12.2-42; **Vertical wind components**, 12.2-43; **Wind transport of spores** (Lloyd et al.), 12.2-65; **Eddy currents in the lee of mountains** (Vitek), 12.2-351; **Vertical currents in cumulus** (Cunningham), 12.2-390.

12.2-367

551.558.2:551.513.2

Koschmieder, E. L., **Über Konvektionsströmungen auf einer Kugel**. [Convection currents on a sphere.] *Beiträge zur Physik der Atmosphäre*, Frankfurt a.M., 32(1/2):34-42, 1959. 6 figs., 8 refs., 37 eqs. German, French and English summaries p. 34. **DWB, DLC**—Assuming a stationary uniformly heated sphere covered by an incompressible fluid of constant thickness, the temperature distribution, equations of motion, radial velocity components and the form of stationary convection currents which would be produced thereby are treated by mathematical and graphic models, and application made to the problem of the general circulation. In spite of all of the assumptions, the model is analogous to that of the meridional circulation on earth and can possibly be used to explain the same. *Subject Headings: 1. Convection currents 2. Meridional circulation models.—M.R.*

12.2-368

551.558.1:551.576.1 (213)

Rodewald, Martin, **Die Inselwolke**. [The island cloud.] *Der Wetterlotse*, Hamburg, No. 128:61-64, March 1958. fig. **DWB**—The term "island cloud" describes the tropical convective cloud formation over sun-heated islands as a result of condensation of rising warm air. The Polynesian navigators utilized these "landmarks" and so did the "Kon-Tiki" expedition. *Subject Headings: 1. Convective cloud structure 2. Tropical clouds.—W.N.*

12.2-369

551.558.2

Court, Arnold (*Forest Service, U. S. Dept. Agric., Berkeley, Calif.*), **Vertical air flow over North America**. *Journal of Geophysical Research*, Wash., D. C., 65(3):947-957, March 1960. 6 figs., 15 refs. **Correction**, *Ibid.*, 65(7):2212, July 1960. **DLC**—Vertical air movement at 600 mb, computed daily by the Joint Numerical Weather Prediction Unit of the National Meteorological Center, and averaged by months as part of a project sponsored by the Office of Civil and Defense Mobilization, is about 0.4 cm/sec over much of North America; the standard deviation is roughly the same magnitude. Averages computed separately for the 00 UT and 12 UT observations show good agreement in the various months, and change slowly from month to month during the six months, December 1958 through May 1959, analyzed. *Subject Headings: 1. Vertical motion 2. North America.—Author's abstract.*

12.2-370

551.509.318:551.558.2:551.515.1 (46)

Ledesma, Manuel, **Ondas de montaña sobre España Central**. [Mountain waves over central Spain.] *Spain, Servicio Meteorológico Nacional, Publicaciones, Ser. A (Memorias)*, No. 33, 1959. 24 p. 6 figs., 2 tables. Spanish and English summaries p. 3.—Synoptic models leading to the lee-waves phenomenon are studied on the 500 mb chart over a period of 12 years. The possibility of a lee-waves occurrence resides almost entirely in cut-off low and blocking situations. A determination is made of the frequency distribution of cut-off low between the Azores and the Iberian Peninsula. Starting from certain empirical assumptions, the geographic variability of the cut-off center is determined as well as the positions which the trough and the jet stream axis must take in the blocking situations and, finally, a critical model is defined. *Subject Headings: 1. Mountain waves 2. Synoptic conditions for mountain waves 3. Spain.—Author's abstract.*

12.2-371

551.558.21:551.43(931)

Farkas, E., **Mountain waves over Banks Peninsula, New Zealand**. *New Zealand Journal of Geology and Geophysics*, (Wellington), 1(4):677-683, Nov. 1958. 4 figs., 2 tables, 8 refs. Reprinted as *New Zealand. Meteorological Service, Meteorological Office Note*, No. 45, 1958. **DWB**—Twenty-seven occurrences of wave motion in the atmosphere over the hilly terrain of Banks Peninsula, South Island, New Zealand, have been analyzed from the Christchurch radiosonde and radar wind records. The average maximum vertical velocity found was

approximately 1,000 ft per min, but velocities up to 2,000 ft per min were found to occur occasionally. The conditions in which these waves may exist and some of their characteristic properties are given. *Subject Headings:* 1. Mountain waves 2. Vertical wind velocities 3. Banks Peninsula, New Zealand.—*Author's abstract.*

AQUEOUS VAPOR AND HYDROMETEORS

HUMIDITY

See also: Dependence of effective radiation upon absorption properties of water vapor (Hinzpeter), 12.2-324.

12.2-372

551.571:001.4 551.586:612.014.4

Hevener, Osborn Fort, **All about humiture.** *Weatherwise*, Boston, 12(2):56;83-85, April 1959. 2 figs., table, ref. **DWB**—The author, who invented the term "humiture" (now found in many dictionaries) in 1937, shows the derivation of the term which is defined as the arithmetical average between the dry bulb temperature and the relative humidity. Even though a better index would result from the use of wet bulb or dew point temperature as an index of the humidity factor in "humiture," the author, being a public relations man, chose relative humidity as more comprehensible to the public and claims the resulting index is not enough different to cause a hullabaloo. In a table he compares the daily indexes reckoned by his method with those by the Wet Bulb Discomfort Index formula of E. C. THOM, for 12 noon, May 1958, and seemingly disproves his own contention, for large differences are noted in many cases. *Subject Headings:* 1. "Humiture" 2. Discomfort indexes.—*M.R.*

12.2-373

551.571:551.574.4

Lejeune, Georges and Savornin, Jean (*both, Univ. of Algiers, Algeria*), **Recovering water-vapor from the atmosphere.** (In: Conference on the Use of Solar Energy, Univ. of Arizona, 1955, *Transactions*, pub. 1958. Vol. 3:138-141. fig., 2 refs.) **DWB**—A theory that in certain hot countries the surface of the earth recovers some condensed water vapor, permitting the observed vegetation to subsist during long periods of drought was tested in a calcareous stone pyramid erected in 1929 by L. CHAPTAL at a place near Montpellier in southern France. This was to check the opinion that was held about Theodosia in Crimea, U.S.S.R., an ancient city believed to have been water-fed about the first century B.C. by limestone pyramids on which water was partially condensed from the atmosphere. Results from southern France proved plausible and further work was carried out in Dakar, West Africa. This was a failure. Further effort is being made at the same place. *Subject Heading:* 1. Condensation of water vapor.—*N.N.*

12.2-374

551.571.36:551.511:551.515.71(491)

Maksić, Branko (*Zagreb*), **Niska vlaga na Zavižanu sredinom ožujka 1957.** [Low humidity at Zavizan in the middle of March 1957.] *Zagreb, Yugoslavia. Hidrometeorološki Zavod NR Hrvatske, Rasprave i Prikazi*, 8(4):145-146, 1959. Serbo-Croatian and English summaries only. **DWB**—The phenomenon of low relative humidity toward the end of the first half of March 1957 is being explained. A low relative humidity appeared in the Middle European region and part of the Balkan peninsula and lasted several days. At Zavizan the period of low relative humidity begins with a precipitate fall of the relative humidity in the first hours of March 12th 1957 and lasts till the afternoon of March 15th 1957 with a minimum during the 13th and 14th of March 1957. The phenomenon is conditioned by a subsidence in a wide anticyclonic area. This assertion can be proved also by a graphical calculation of the isobaric field, that is the horizontal divergency $\left(\frac{\partial u}{\partial x} + \frac{\partial v}{\partial y}\right)$ on the isobaric surfaces 1000, 850 and 700 mb. The extent of vertical speeds is being computed and compared with results obtained by calculating the vertical speeds by the Bellamy method, in which aerological data about the wind from three sounding stations are made use of. The results tally within the

limits of accuracy. The possibility of calculating the lower limit of relative humidity is shown. The lowest terminal observation of relative humidity at Zavizan was on March 13th 1957 at 21 hours and it amounted 12%, while two hygrographs marked 0%. An explanation is given for such behavior of the hygrographs. *Subject Headings:* 1. Relative humidity variations 2. Humidity drop 3. Anticyclone-humidity relationships 4. Zavizan, Yugoslavia.—*Author's summary.*

EVAPORATION AND EVAPOTRANSPIRATION

See: Evaporation formulas (Kuchеров, Rikenglaz), 12.2-381.

CONDENSATION

See also: Icing of jet aircraft (Johnstone), 12.2-36; *Ice formation on still water* (Fujino, Suzuki), 12.2-190; *Condensation nuclei experiments* (Justo, Pilić), 12.2-223; *Cloud seeding with silver iodide* (Vonnegut), 12.2-252; *Ice storms, Illinois, 1959* (Joos), 12.2-293; *Condensation of water vapor* (Lejeune, Savornin), 12.2-373; *Elec. charges on drops* (Mühleisen), 12.2-430.

12.2-375

551.574.1 551.552:531.52:531.32

Amelin, A. G. and Beliakov, M. I., *K voprosu ob osazhdenii kapel' iz potoka*. [The problem of the settling of drops from an air current.] *Akademiia Nauk SSSR, Doklady*, 108(1):31-33, May/June 1956. 3 figs., 9 refs. **DLC**—The lack of a reliable mathematical relationship between the coefficient of capture and the Stokes criterion prevents the determination of the rate of settling of suspending particles upon an object around which an air stream flows. Since the solution of the differential equations of motion of suspended particles flowing around an object is difficult, the author suggests an experimental approach and the use of the theory of similitude to work up the data. The results of experiments on the settlement of droplets on the front and rear sides of cylinders are presented in graphs which give the relationship between the coefficient of capture and the Stokes criterion. *Subject Headings:* 1. Particle settling rate 2. Particle trajectory 3. Stokes law.—*I.L.D.*

12.2-376

551.574.1:551.578.41

Chalmers, Bruce, *How water freezes*. *Scientific American*, N. Y., 200(2):114-122, Feb. 1959. 14 figs. (incl. photos). **DWB, DLC**—The author describes the chemistry of ice crystals as based on low temperature and the diversified nuclei of snowflakes, "ice worms" and frost heaves. *Subject Headings:* 1. Ice crystal nuclei 2. Condensation mechanisms.—*N.N.*

12.2-377

551.574.1:551.574.7:629.13

†Gelder, Thomas F. (*Lewis Flight Propulsion Lab., Cleveland, Ohio*), *Droplet impingement and ingestion by supersonic nose inlet in subsonic tunnel conditions*. *National Advisory Committee for Aeronautics, Technical Note 4268*, Washington, D. C., May 1958. 56 p. 14 figs. (incl. photos), 2 tables, 28 refs., eqs. **DLC**—The amount of water in cloud droplet form ingested by a full-scale supersonic nose inlet with conical center body was measured. Local and total water impingement rates on the cowl and center-body surfaces were also obtained. All measurements were made with a dye-tracer technique. Inlet angles of attack of 0° and 4.2°, droplet diameters from 11 to 20 microns, and ratios of inlet to free-stream velocity from 0.4 to 1.8 were studied. Measurements were confined to a free-stream Mach number of 0.237 and are extendable to other subsonic speeds by dimensionless impingement parameters. *Subject Headings:* 1. Drop impingement on aero engines 2. Dye tracer techniques.—*NACA abstract.*

12.2-378

551.574.1:551.578.41:537.226

Gränicher, H. and Jaccard, C., *The complex permittivity of ice crystals*. *Archives des Sciences*, Geneva, 12(4):52-58, 1959. 15 refs. **DLC**—The ice crystals possess very particular dielectric properties. One observes a high static permittivity, a relaxation of the Debye

type at relatively low frequencies and a conductivity in direct current. It has been proved that these electrical properties can be interpreted theoretically only when one admits the simultaneous existence of typical reticular defects: the ions H_3O^+ , OH^- and the valency faults (or Bjerrum's ones). The present theory takes these four types of defects into account, and also their properties of molecule reorientation along their diffusion paths. The results indicate that relaxation time and conductivity at high frequency are determined by the major mechanism, in pure ice and in the valency faults. Because of this fairly distinct prevalent character, the static permittivity does not depend on the concentration and mobility of the faults. On the other hand, the conductivity in direct current is due to the minor mechanism of ions. Their concentration is very slight, but their mobility is extremely high, which can be explained through the tunnel-effect of protons along the hydrogen bindings. *Subject Headings: 1. Ice crystal structure 2. Dielectric properties of ice.—A.V.*

12.2-379

551.574.1:667.633 551.574.7

Jellinek, H. H. G., **Contact angles between water and some polymeric materials.** *U. S. Snow Ice and Permafrost Research Establishment, Research Report 36*, Aug. 1957. 10 p. 2 figs. (incl. photo), table, 3 refs., 6 eqs. **DLC**—Measurements were made with 22 more or less hydrophobic polymers and lacquers at intervals of 5 or 10 min. for periods up to 1 hr. All surfaces were carefully cleaned, and some surfaces were baked. Highest initial (time 0) average contact angles (106° – 106.6°) were measured for Foster Snell rain repellent wax, Barrett 25-218 water repellent varnish (air-dried), and Cardolite NRI-7241. After 40 min., contact angles for these substances were 95.6° , 90.9° and 91.0° . The measurement apparatus is illustrated, and data are tabulated. *Subject Heading: 1. Anti-icing materials.—SIPRE abstract.*

12.2-380

551.511.13:551.574.1

Krasikov, P. N. and Chikirova, G. A., **Vliianie primesei khloristogo ammoniia na us-toichivost' vodnykh tumanov.** [Influence of ammonium chloride admixtures on the stability of water drop fogs.] *Leningrad. Glavnaia Geofizicheskaiia Observatoriia, Trudy*, No. 82:41-44, 1958. 3 figs., 7 refs. **DLC**—Experiments were carried out on the effect of admixtures of NH_4Cl upon the stability of water cloud, i.e., displace phase of a cloud consisting of liquid drops of water into which a small admixture of NH_4Cl has been introduced to influence the structure and stability of the fog. The cylinder within which the fog was formed, the formation of the fog, the measurement of the thickness of the fog and the experimental procedure are described. The stability of the fog was determined by measuring the opacity (turbidity) $R = (1 - I/I_0)$ where I_0 and I = light intensity incident upon the light element after passage through pure air and through fog respectively. By comparing variations in R with and without admixtures of NH_4Cl the effect of the latter upon the stability of a fog is determined. The results of experiments show that additives of NH_4Cl increase the stability of fogs. The variations of opacity (R) with time, distribution of drops according to size and water content of fog are shown on graphs. The increase in stability of aqueous clouds after preliminary sublimation of NH_4Cl is explained by the introduction of a large number of hygroscopic condensation nuclei. *Subject Headings: 1. Drop stability 2. Ammonium chloride.—I.L.D.*

12.2-381

551.574.1:551.573:532.5

Kucherov, R. Ia. and Rikenglaz, L. E., **O gidrodinamicheskikh granichnykh usloviakh pri isparenii i kondensatsii.** [On hydrodynamic boundary conditions for evaporation and condensation.] *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki*, Moscow, 37(1):125-126, July 1959. 4 refs., 9 eqs. Russian summary p. 125; English summary p. 126. **DWB**—Boundary conditions are determined for the hydrodynamic equations which take into account evaporation and condensation. For small evaporation rates the temperature jump and deviation of the vapor pressure from the equilibrium value were found to be of the order of the ratio of the vapor flow velocity v to the mean thermal velocity c . It is shown that the usual expressions for matter and heat fluxes for evaporation and condensation contain an error. *Subject Headings: 1. Hydrodynamic equations 2. Evaporation formulas 3. Condensation mechanisms.—Authors' summary.*

12.2-382

551.574.1:533.6.01

Lundquist, G. A., **Recent experimental work at NOL on condensation in compressible flows.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 37. Vol. 2:1-20, July 1955. **DLC**—Results of experiments undertaken at the Naval Ordnance Laboratory on the subject of spontaneous condensation of gaseous vapors are discussed. The wind tunnel used in the experiments is described. It was hoped that air would supersaturate in a similar method to water vapor and calculations were made using the theory of Becker-Döring and they predicted a fairly substantial supersaturation of the components of air—nitrogen and oxygen. However, when the tests on these gases were made it was found that condensation occurred very near the equilibrium saturation point of air. We found that the foreign particles in the flow due to the carbon dioxide left in the air and the water vapor for these large amounts of air and even then the vast amount of water vapor generates a considerable number of foreign nuclei. Calculations show that the water vapor alone for the dew point -50° or -60° , the number of particles possible per cc is of the order of 10 to the 8 which is probably more than sufficient to cause equilibrium condensation of the air rather than the spontaneous condensation we had hoped we would get. Additional reasons given from which it can be seen that the problem of condensation is no longer of great importance to wind tunnels because it seems that no matter what we do here we are going to have it in the flow. The only thing possible now is to heat the air to keep it from condensing. Discussion with REISS and PROBSTEN, ANDERSON, BARRETT, JURA followed. *Subject Headings*: 1. Condensation mechanics 2. Spontaneous condensation of gaseous vapors 3. Wind tunnel experiments 4. Aerodynamics.

12.2-383

91.04(969)

551.574.1:551.578.41

Nakaya, Ukichiro; Sugaya, Juji and Shoda, Mikio, **Report of the Mauna Loa Expedition in the winter of 1956-1957.** *Sapporo, Japan. Hokkaido Univ. Faculty of Science, Journal*, Ser. 2, 5(1), 1957. Reprint of 36 p. 17 figs., 7 plates (42 photos), 7 refs. Summary p. 32. **DLC**. Also issued in reprint as *Munitap Foundation, Inc., N. Y., Occasional Papers*, No. 0028, May 1957. Also issued as: *Hawaii. Univ. Institute of Geophysics, Contribution*, No. 1, May 1957.—The results of an expedition to the Mauna Loa in Hawaii carried out during the winter of 1956-1957 in order to investigate the characteristics of snow crystals in regions where the concentration of aerosol particles is at a minimum. Condensation nuclei were studied by means of the EG condensation nuclei meter, which is a modification of the Nolan-Pollak counter. The operation of this device and its use in determining the number of aerosol particles and their size distribution are described with the aid of equations and graphs. Experiments were carried out to determine the effect of local pollution upon aerosol content, namely effect of generator exhaust, car exhaust, cigarette smoking, inhabitation and airplane exhaust, and to determine the relationship between the nuclei number and prevailing wind direction, between nuclei number and fog. Profiles of distribution of condensation nuclei between Mount Hilo and the Slope Observatory were made for fine and cloudy weather and in rain and snowfall. The investigations on the nature of snow crystals involved an analysis of crystals of the needle and columnar character, of the development of crystals in the basal plane and of the initial stage of snow crystals; of the weather conditions during the various snowfalls, the crystals of which were being investigated; of the frequency of occurrence of each type of snow crystal and of the relation between type of snowfall and weather conditions. Also the characteristics of ice pellets and frost crystals observed at Mauna Loa are discussed. The results of the investigations are presented in the form of graphs. Numerous microphotographs of the snow crystals are included. *Subject Headings*: 1. Snow crystals 2. Condensation nuclei measurement techniques 3. Mauna Loa Expedition, 1956-1957 4. Mauna Loa, Hawaii.—*I.L.D.*

12.2-384

551.574.1:551.594.253

Nikandrov, V. Ia., **K voprosu o zariade chastits oblakov i tumanov.** [The problem of the charge of cloud and fog particles.] *Leningrad. Glavnaia Geofizicheskaya Observatoriia, Trudy*, 57(119):36-39, 1956. 7 refs., table. **DLC**—Various studies on the ionic properties of water droplets which are weak solutions of NaCl, MgCl₂, etc. and hence are similar to cloud and fog droplets, are summarized. The possible establishment of excess of either positive or negative

ions in weak salt solutions during evaporation and diffusion, in particular in the non-homogeneous phases, existing in clouds or fogs is considered and data are presented on the mobility and absolute velocities of Na^+ and Cl^- as calculated by the equation of Kohtrausch, in which the influence of temperature upon ionic dissociation is taken into account. The low probability of the occurrence of local potential gradients in clouds sufficient for thunderstorm charges during the cold season is explained by the differential distribution of ions. *Subject Headings: 1. Ionic theory of condensation nuclei 2. Electrification of clouds 3. Electrification of fog particles.—I.L.D.*

12.2-385

551.574.1:551.508.91

Thuman, William C. and Cadle, R. D., **Development of technology for production, sampling, and assay of simulated atmospheres in closed chambers.** Stanford Research Institute, Menlo Park, Calif., Contract DA-18-064-404-cml-319, Letter Progress Report, No. 10, May 18-June 18, 1958. Issued July 15, 1958. 6 p. incl. tables. (Original unchecked) (Astia AD-204-207)—The slopes, day effects, and confidence limits were obtained for gases which were monitored individually in the complete gas mixture. The particulate mixture was prepared. A method for introducing the particulate mixture and the oil aerosol was tested, together with a method for monitoring the aerosol over the 2-hr test period. (See also AD-200-013, AD-209 573.) *Subject Headings: 1. Aerosol sampling and analysis 2. Atmospheric pollution test chambers.—Authors' abstract.*

12.2-386

551.511.13:551.574.1:551.578.11

Volevakh, N. M., **Usloviia vypadeniia zhidkikh osadkov na Ukraine pri otritsatel'nykh temperaturakh u poverkhnosti zemli.** [Conditions for the occurrence of liquid precipitation in the Ukraine during below zero temperatures near the earth's surface.] *Kiev, Ukraine. Nauchno-Issledovatel'skii Institut, Trudy*, No. 5:150-158, 1956. 6 figs., 5 tables, 4 refs. DWB, DLC—On the basis of meteorological and upper level observation data for the period 1946 to 1954 it has been found that for a complete elucidation of these conditions it is necessary to take into account not only the synoptic situation and the absolute values of meteorological elements, but also the character of the change of meteorological elements with height and of the temperature. These temperature changes with height can be of three types: (1) presence of an air layer with positive temperature in the upper level; (2) presence of an inversion or isothermal air layer with negative temperature; (3) absence of inversion or isothermal layers aloft. Liquid precipitation during below zero temperature near the earth's surface occurs most often from clouds of homogeneous air masses (53%) and during the passage of warm fronts (32%). In order to determine the probability of such precipitation, especially of frontal precipitation, it is necessary to be acquainted with the temperature regime, the cloud structure and cloud elements. *Subject Headings: 1. Frontal precipitation 2. Precipitation physics 3. Liquid precipitation 4. Frontal precipitation probabilities 5. Rain temperatures 6. Ukrainian S.S.R.—A.M.P.*

12.2-387

551.574.12:551.577.1

Mason, B. J. (Imperial College, London), **The formation of rain by coalescence in very shallow cumulus.** *Tellus*, Stockholm, 11(2):216-219, May 1959. 2 figs., 10 refs. DWB, DLC—It is demonstrated theoretically that showers may be released by coalescence from shallow cumulus, only 1 km deep, lasting for one hour and having cloud-droplet spectra typical of those measured in clouds formed in clean, maritime air. In clouds formed in more heavily polluted continental air and which have higher concentrations of smaller cloud droplets, the coalescence process is delayed and retarded so that, under otherwise comparable conditions, the time required for shower formation is considerably increased. *Subject Headings: 1. Coalescence 2. Rain formation 3. Condensation processes.—Author's abstract.*

FOG

See: **Fog prevention** (Ramsey), 12.2-248; **Fog dissipation** (Smith, Wexler), 12.2-249; **Fog dissipation** (Smith et al.), 12.2-250; **Fog formation** (Gangopadhyaya, George), 12.2-389.

CLOUDS

See also: **Cloud forecasting** (O'Connor), 12.2-243; **Artificial cloud modification** (Smith et al.), 12.2-250; **Advection of heat in clouds** (Kagan), 12.2-280; **Cloud theories** (Gutman), 12.2-287; **Tropical clouds** (Rodewald), 12.2-368; **Thunderclouds** (Chapman), 12.2-428.

12.2-388

551.576.1:551.558.2(791)

Braham, Roscoe R., Jr. and Draginis, Milton (*both, Univ. Chicago*), **Roots of orographic cumuli**. *Journal of Meteorology*, Boston, 17(2):214-226, April 1960. 8 figs., 2 tables, 12 refs. **DWB, DLC**—In an effort to disentangle the "orographic barrier" and "high-level heat source" effects, as they may combine to lead to the development of summer convective clouds over mountains, a series of measurements was undertaken in Arizona. With use of an instrumented airplane, measurements of temperature and dew point were obtained for a series of passes up- and downwind across a 9000-ft mountain range. Passes ranged in altitude from 10,000 to 14,000 ft. Data obtained at sunrise show very clearly the barrier effect which forced air to ascend about 1000 ft in crossing the ridge. After the mountain slopes became heated by insolation, a convection core formed over and slightly downwind from the ridge. This core served as the root of several small cumulus clouds which developed during the time of measurement. *Subject Headings: 1. Orographic cumulus 2. Cumulus formation 3. Wind effects on cloud formation 4. Arizona.—Authors' abstract.*

12.2-389

551.576.1:551.511.32:551.575.1

Gangopadhyaya, M. and George, C. A. (*both, Regional Met. Centre, Calcutta, India*), **Horizontal convergence as a factor for fog and stratus at Calcutta (Dum Dum)**. *Journal of Geophysical Research*, Wash., D. C., 64(8):997-1005, Aug. 1959. 5 figs., table, 9 refs. **DLC**—Fog or stratus at Calcutta (Dum Dum) was found to be associated with horizontal convergence and rarely, if at all, with divergence of air flow within the surface inversion. It is considered that turbulent eddies likely to be caused by convergence and divergence will respectively tend to augment or retard cooling of the surface air layers. It is also shown that low level convergence will usually increase moisture advection, while divergence will lead to desiccation of surface air layers, thereby aiding or inhibiting, as the case may be, formation of fog or stratus over the station. A few specific situations, favorable as well as adverse to fog formation at Calcutta (Dum Dum) have been discussed in the light of the observed horizontal divergence of air flow at the 1000 ft level. *Subject Headings: 1. Horizontal convergence 2. Fog and stratus formation 3. Dum Dum, Calcutta.—Authors' abstract.*

12.2-390

551.558.1:551.576.11

Cunningham, Robert M. (*Geophysics Res. Directorate, Air Force Cambr. Res. Ctr., Air Res. & Develop. Command, Bedford*), **Cumulus circulation**. *Conference on Atmospheric Electricity, 2nd, Portsmouth, N. H., May 1958, Proceedings*, issued 1958. p. 361-367. 5 figs. **DWB** (M(055) C748pr)—A detailed study of cumulus and cumulonimbus clouds formed over the Island of Grand Bahama is described. Some 14 passes were made through and below clouds from 20,000 ft to 500 ft with an aircraft instrumented with water content meters, rapid response thermometers, and with an instrument which responds rapidly to water vapor variations. Geography and wind were such that clouds in all stages of development could be studied at will throughout the afternoon by a slight shift of position relative to the upwind coastal point. Cloud circulation is deduced from temperature, humidity and water content measurements with the aid of many photographs. The larger clouds, which develop explosively some 10 miles downwind from the island shore, have a warm core of undiluted air which originates close to the ground. The cold shell of these clouds is composed of mixed air, partly core air and partly ambient. This mixed air descends in pulses and it is of interest in the light of some theories of thunderstorm electrification which require extensive cloud shell downdrafts that this air apparently does not descend very far, but spreads out under various minor stable layers unless assisted by the addition of precipitation. The continuous deep downdrafts do not develop until the rain stage is reached. *Subject Headings: 1. Cumulus cloud structure 2. Vertical currents in cumulus.—Author's abstract.*

12.2-391

551.576.11:551.515.4:778.3:551.558.1

Knöll, K. H.; Neumann, H. G. and Reuss, J. H., *Ein symmetrischer cumulonimbus (Wolken-Reihenbilder IV)*. [A symmetrical cumulonimbus (Cloud picture series No. 4).] *Beiträge zur Physik der Atmosphäre*, Frankfurt a.M., 32(1/2):65-77, 1959. 7 figs., 3 refs. German, English and French summaries p. 65. DWB, DLC—At the end of a record heat wave in central Europe June 29–July 7, 1957, a study was made of the growth of cumulonimbus clouds which occurred when modified MP air penetrated into the Wiesbaden area where dry stable tropical air had prevailed (temp. 30°C or 102°F in Rhein-Main area on July 6) for over a week. The massive Cb-cloud was photographed from Darmstadt at minute intervals from 16⁵³ to 17²³, and examples obtained every 5 minutes reproduced. A thunderstorm occurred at Darmstadt at 21 h. Heights of protuberances were calculated for a number of points and shown on a nomogram and diagrams. It was assumed that the top of the Cb-cloud did not penetrate above the sharp tropopause (11–12 km) as observed at Wiesbaden on July 8 at 11 and 23 h. Curves of growth are shown for numerous points, each of which is shown diagrammatically for one minute intervals. From these the vertical velocity is calculated as 8.5 ± 1.8 m/sec for one period (16⁵⁵–17¹⁰) and 7.2 ± 1.7 m/sec for the second period (17⁰⁸–17²⁶) with extreme values of 14.0 and 3.0 m/sec for 1st and 13.0 and 1.0 m/sec for the second period of growth. Horizontal speeds were 24–30 m/sec for Amboss calculated from photo and Wiesbaden soundings, respectively, and 15–23 m/sec for turrets, respectively. Rainfall patterns and isochrones of beginning and ending are also calculated and shown graphically as the storm swept from Wiesbaden in a direction of 215°–250° (from SW) toward Giessen. Cartographic (photogrammetric) methods are described in detail in an appendix. It was so hazy that the lower boundary of the cloud could not be determined accurately. *Subject Headings*: 1. Cumulonimbus development photographs 2. Vertical wind velocities from cloud photographs 3. Cloud photogrammetry 4. Wiesbaden, Germany 5. Darmstadt, Germany. —M.R.

12.2-392

551.576.12:779

Ives, Ronald L. (*Palo Alto, Calif.*), *Areas of occurrence of "grindstone" clouds*. *Weather-wise*, Boston, 11(6):201–203, 218, Dec. 1958. 3 figs., 6 refs. DWB—Two fine examples of photographs of standing or "grindstone" clouds made near Boulder, Colorado, are presented to show saucer-like appearance of these lenticular wave clouds which often occur in the lee of mountain ranges. A map of the western states shows areas where such clouds have been reported; usually to the lee of the main mountain ranges which intercept the westerlies, i.e. in the Chinook areas. A few exceptions are the Black Hills and northern Nevada just east of the Sierras. Major areas are central Washington and Oregon, Montana and eastern Colorado. One-third of "flying saucer" photographs from these areas were easily identifiable as standing clouds. *Subject Headings*: 1. "Grindstone" clouds 2. Lenticular cloud photographs 3. Standing clouds 4. Flying saucers 5. Lee effects 6. Boulder, Colo. 7. Western U. S.—M.R.

PRECIPITATION

See also: Rainfall effects on tobacco production (du Plessis), 12.2-57; Drought effects on sugar beet yield (Geslin), 12.2-58; Rainfall probability forecasts (Turner), 12.2-68; Hurricane rainfall data (Gilman, Myers), 12.2-84; Synoptic conditions for precip. (Stefanov), 12.2-238; Record precip., Crohamhurst (Brunt), 12.2-299; Rain formation (Mason), 12.2-387; Rainfall distribution (Rao), 12.2-397.

12.2-393

551.577.1:551.511

Fujiwara, M. (*Met. Res. Inst., Tokyo*), *Precipitation form of a convection cell*, Pt. 1. *Papers in Meteorology and Geophysics*, Tokyo, 9(3/4):141–151, Jan. 1959. 8 figs. (incl. photos), table, 3 refs., eqs. Japanese summary p. 151. DWB—From raingauge records, showery rainfalls from convective clouds were picked out, and the form of the time-section pattern of the rain intensity was investigated. It was found by means of some normalization that the form is expressed by the formula,

$$I = A\tau^m \exp(-n\tau),$$

where I denoted intensity of rain, τ , time and m and n are constants. This typical form maintains in the developing stage of the convection cells up to moderate. The elementary cells as shown by the formula are usually supposed to be amalgamated into one cell when the convection has grown up so as to bring an extremely intense rain such as more than 10 mm per ten minutes. *Subject Headings: 1. Convective rainfall 2. Convective cells 3. Rainfall intensities.—Author's abstract.*

12.2-394

551.577.3 (522.31)

Ichiki, B. and Soda, M., *On the return period of daily precipitation in Saga Prefecture*, Pt. 1. *Journal of Meteorological Research*, Tokyo, 8(1):52-53, March 1956. 2 tables. In Japanese. DWB, DLC—Return periods of rainfall at 15 weather stations in Saga Prefecture are calculated with data of 14-64 years periods. Rainfalls of daily maximum and of return periods of 500, 200, 100, 50, 10 and 5 years are tabulated. Return period for the range of 120-200 mm is calculated. If the return period is too long, estimated value of daily rainfall becomes meaningless. *Subject Headings: 1. Rainfall variations 2. Long period precipitation records 3. Saga Prefecture, Japan.—J. Woo.*

12.2-395

551.577.3 (548.7)

*†Steel, Robert Walter and Fisher, C. A. (eds.), *Geographical essays on British tropical lands*. London, George Philip, 1956. 344 p. figs., tables, foot-refs. p. 225-268, Farner, B. H.; *Rainfall and water-supply in the Dry Zone of Ceylon*. 6 figs., 11 tables, foot-refs. DLC (G515.S78). Review by Keith Buchanan in *Geographical Review*, 48(3):447-449, July 1958.—This chapter gives an excellent calendar, graphic and verbal analysis of the rainfall and its variability in the north and east lowlands of Ceylon. Mean conditions and regional, seasonal, and year-to-year variations are treated. Duration of dry and wet periods, effective rainfall and its reliability; rainfall and malaria; geology, relief and water-supply, and agricultural relations are discussed. Temperature and wind conditions are also briefly analyzed. *Subject Headings: 1. Rainfall variability in Ceylon 2. Ceylon.—M.R.*

RAIN, SNOW AND HAIL

See also: Arctic whiteout (Fritz), 12.2-10; *Rainfall-runoff relationships* (Srebrenovic), 12.2-166; *Snow cover obs., Switzerland* (Renaud), 12.2-180; *Ice formation on still water* (Fujino, Suzuki), 12.2-190; *Drop size measurement* (Deloncle), 12.2-215; *Hail suppression*, 12.2-253; *Hail prevention* (De Rossi), 12.2-255; *Cooling effect of snow cover* (Péczezy), 12.2-285; *Snow data, Coleshill, Eng.* (Gold), 12.2-354; *Freezing of water* (Chalmers), 12.2-376; *Dielectric properties of ice* (Gränicher, Jaccard), 12.2-378; *Snow crystals* (Nakaya et al.), 12.2-383; *Precip. in below zero temps.* (Volevackha), 12.2-386.

12.2-396

551.578.481

Iashina, A. V., *Mokrye snezhnye laviny*. [Wet snow avalanches.] *Priroda*, Moscow, No. 5:111, May 1958. fig. DWB, DLC—Snow avalanches occur in winter generally on the most steep and snow covered parts of slopes. As a result of recrystallization a friable horizon is formed. Depending upon meteorological conditions the avalanches are either dry or wet. The former are characteristic of frost weather. March-April is the time of occurrence of wet avalanches in the Upper Baksan district (Central Caucasus). Wet snowfall and snow melt favor avalanches. Slightly compacted snow lying on the snow a long time and having become moist as a result of atmospheric or radiational melting, slides along the avalanche ravine in a dense snow stream. At the foot of the slope large cones of avalanche snow of small crystalline structure with a mean density of 0.50-1.60 cm³ are formed. After extensive snow melt the avalanche may have a crumpled structure. *Subject Headings: 1. Wet snow avalanches 2. Avalanche formation 3. Central Caucasus.—I.L.D.*

HYDROMETEOROLOGY

See also: **Sec. F2**, p. 265; **Forest effects on water regime** (L'vovich), 12.2 63; **Soil moisture regime, Dehra Dun** (Seth, Waheed Khan), 12.2-64; **Ground water hydrology** (Schuster), 12.2 151; **Lake hydrology, Lake Orta** (Picotti), 12.2-175; **Lake hydrology** (Janardham), 12.2-177; **Water content of snow cover** (Ambach), 12.2-217; **Soil moisture measurement** (Vilkner), 12.2-230; **Freeze-thaw frequencies, Canada** (Fraser), 12.2-340.

12.2-397

551.579(54)(08) 551.577.2/34(54)

†Rao, K. N., **Hydrometeorological studies in India**. (In: I.U.G.G. Association of Scientific Hydrology, **Symposia Darcy, Dijon, Sept. 1956** (Proceedings), Vol. 3, pub. 1957(?). p. 263-270. figs., tables, 24 refs., eqs.) DWB (M79 161sym)—Report of a detailed hydro-meteorological study of the river catchments in India, including the general, physical and the meteorological characteristics of the areas, a comparison of the mean rainfall, its secular change and areal distribution. Charts based on data for the uniform period 1901 to 1940 are given. *Subject Headings*: 1. Hydrometeorological studies 2. Rainfall distribution 3. India. —N.N.

12.1-398

551.579(54)

Rao, K. N., **Hydro-meteorological studies of Damodar and Mayurakshi catchments**. *Indian Journal of Power and River Valley Development*, Calcutta, 7(9):24-28, Sept. 1957. 8 figs., 4 tables. **DLC**—Data on various statistical parameters of seasonal rainfall, extreme precipitation amounts and runoff are tabulated for the Damodar and Mayurakshi catchments, and a comparison is made between the two catchments, based on the period 1891-1950. The graphs presented include frequency distribution curves and depth area curves. *Subject Headings*: 1. Hydrometeorological studies 2. Damoder catchment, India 3. Mayurakshi catchment, India.—G.T.

CLIMATOLOGY AND BIOCLIMATOLOGY

CLIMATE OF PARTICULAR PLACES

See also: **Climatic maps, India**, 12.2-2; **Climate, N. Greenland** (Georgi), 12.2-7; **Climat. data, Antarctic**, 12.2-14; **Climate, Antarctica** (Lepikhin), 12.2-15; **Climate, Paris** (Geslin), 12.2-58; **Climate, Labrador-New Quebec** (Twidale), 12.2-127; **Runoff maps, Urals** (Kemmerikh), 12.2-164; **Annual climatic data summaries, India**, 12.2 201 to 12.2-203.

12.2-399

551.582(56,59):551.557.5

Trewartha, Glenn Thomas, **Climate as related to the jet stream in the Orient**. *Erdkunde*, Bonn, 12(3):205-214, Sept. 1958. 9 figs. German summary p. 205. **DLC**—The regional description given here is meant to serve as a sample of genetic climatology applied to certain coincidences between the jet stream and the climate in southern and eastern Asia which is also elaborated upon graphically. The governing influence of the jet stream when reappearing south of Himalaya, Oct.-Nov., is particularly evident in the case of the winter climate of India, Pakistan, and southern China. *Subject Headings*: 1. Climate of Asia 2. Jet stream effects on climate 3. South West Asia 4. South East Asia.—W.N.

12.2-400

581.9:551.582.2(699.13)

Cour, P., **Flore et végétation de l'Archipel de Kerguelen**. [Flora and vegetation of the Kerguelen Archipelago.] *France. Ministère de la France d'Outre-Mer, Terres Australes et Antarctiques Françaises*, Paris, No. 8/9:3-40, July/Oct. 1959. 14 plates, 3 tables. **DLC**—This study of the distribution of the various plant species in the Kerguelen Islands includes a climatological survey of this archipelago characterized by a cold oceanic subantarctic climate. It is continuously under the influence of a zone of disturbance belts and undergoes, following the months, the passage of ten to fifteen depressions giving the seasons their poorly marked character. Wind is seldom calm; three hundred days out of a year the peak speeds attain nearly 90 km/h, and a 250 km/h speed is recorded twice or thrice a year. The monthly mean

temperatures vary from 2°C (June) to 7.8°C (February); the extremes range between 20 to 21°C (max.) and -8 to -9°C (min). Precipitation occurs on 230 days with a yearly amount of 1100 mm. Precipitation occurrence is fairly regular throughout the various months of the year. The annual sunshine, passably abundant, reaches on the average 1720 hours. A table contains the mean and extreme values of the principal climatic elements at the station Port-aux-Français for the period 1951-1958. The article goes further with an examination of the ecological conditions, a description of the plant associations, the coastal formations, the stony formations, the moraines, etc. *Subject Headings:* 1. Climate of Kerguelen Islands 2. Atmospheric disturbance effects on climate 3. Ecology 4. Plant distribution 5. Kerguelen Islands.—A.V.

CLIMATIC CHANGES

See also: **Climat. variations, Ruwenzori** (Whittow, Shepherd), 12.2-181; **Climat. changes, Sonora** (Ives), 12.2-416.

12.2-401

551.583:581.056:634.9(931)

Bell, Virginia and Bell, Robert E., **Dendrochronological studies in New Zealand.** *Tree-Ring Bulletin*, Tucson, Ariz., 22(1/4):7-11, Dec. 1958. 2 figs., 5 refs. DWB—From a study of tree-ring specimens throughout New Zealand, it appears that it should be possible to construct master charts, for archaeological dating, of kauri, totara, and white pine for the Auckland district. It is possible to establish a minimum age date for archaeological sites by ring counts from trees found growing on top of the sites. Samples have been collected from three such sites in Otago, and the following minimum age dates are indicated: Hina Hina midden—over 240 yrs; Pounawea midden—over 219 yrs; Papatowai midden—over 256 yrs. It is also clear that tree-ring studies will progress slowly. Aside from the absence of basic botanical data which could be of considerable aid, crossdating is extremely difficult. Apparently local conditions are so variable that broader climatic factors become hidden or distorted so that crossdating is impossible in the majority of specimens. Many trees lack circuit and vertical uniformity, are subject to periods of compressed rings, or have ring structures which are difficult to read. *Subject Headings:* 1. Dendrochronology 2. Dendroclimatology 3. New Zealand.—*Authors' abstract.*

12.2-402

551.583.3(794)

Hubbs, Carl L. (*Scripps Inst. of Oceanog.*), **Recent climatic history in California and adjacent areas.** (In: California. Univ. Scripps Institution of Oceanography, **Proceedings (of the) Conference on recent research in climatology**, March 1957. Issued Univ. of California. p. 10-22.) DWB (M8 C153co)—The basic hypothesis of this paper is "that the trend toward a drier and less uniform climate that seems to have persisted through Tertiary time has continued, with enormous fluctuations, through the Pleistocene, and then on through post glacial time." Paleobiological evidence and recent developments in the flora and fauna of California and adjacent regions are referred to in support of this and several accessory hypotheses. This evidence leads the author to believe in a continued and perhaps prolonged "march of the desert" in the future in southwest U. S. *Subject Headings:* 1. Climatic trends 2. California.—G.T.

12.2-403

551.311.1:551.583.3(672)

Barbier, Reynold. **Sur l'âge des latérites.** [On the age of laterites.] *Académie des Sciences, Paris, Comptes Rendus*, 250(7):1306-1308, Feb. 15, 1960. 2 refs. DWB, DLC—The author hypothesizes that the genesis of laterites in French Equatorial Africa is, contrary to the general belief, more related to the geological past of the region than to the present climate, the influence of which may be only secondary. *Subject Headings:* 1. Geomorphology 2. Structure of laterites 3. Climatic changes 4. French Equatorial Africa.—A.V.

12.2-404

551.583.3:551.32(98)

Livingstone, D. A. (*Duke Univ., Durham, N. C.*), [Comment on] M. Ewing and W. L. Donn: **Theory of ice ages**, [and] Reply by Ewing and Donn. *Science*, Wash., D. C., 129(3347):

463-464, Feb. 20, 1959. 13 refs. **DLC**—Livingstone takes exception to a number of items advanced by Ewing and Donn as evidence for their theory of ice ages (for abstract on Pt. 1, see 7.11-274, Nov. 1956, and on Pt. 2, 10.2-44, Feb. 1959, *Met. Abstracts*). He cannot see why a system such as proposed by EWING and DONN would oscillate at all and thinks that evidence for a northerly position of the ice divide is not conclusive. The nonglaciated areas of the Arctic refute an Arctic-centered glaciation; pollen studies show vegetation changes in circumpolar area have been parallel and synchronous with those in temperate latitudes and finally fossil evidence refutes any great amount of polar wandering. EWING and DONN deny the necessity for a quantitative model to support oscillation, give special emphasis to effect of the presence or absence of the pack-ice itself as a regulatory factor in oceanic circulation as well as precipitation cannot accept presence of unglaciated areas as proof of non-existence of glaciers in Arctic (uneven atmospheric circulation patterns and topography would produce varying glaciation, and parts of the Arctic may have been submerged); and deny that there is anything wrong with using new and unpublished data to develop new models even though they contradict orthodox theories. *Subject Headings*: 1. Ice age theories 2. Ewing and Donn ice age theory 3. Arctic glaciation 4. Arctic.—M.R.

12.2-405

551.311.1:551.583.3

Pias, Jean, *Sédimentation au Quaternaire dans l'Est de la cuvette tchadienne (Massifs du Ouaddai et de l'Ennedi; plaines de piedmonts.)* [Sedimentation during the Quaternary East of the Chad Basin (Ouaddai and Ennedi mountain masses; foot-hill plains).] *Académie des Sciences, Paris, Comptes Rendus*, 250(8):1514-1516, Feb. 22, 1960. 4 refs. **DWB, DLC**—Pedologic and geomorphological studies indicate the presence in the eastern regions of the Chad Basin of four sedimentary series from pluvial or pluvialacustrine origin, appearing as the homologues of those observed in the Logone and Chari basins. These series reconstitute the recent geologic history of this part of the Chad Basin. The first sandy series, which is the most ancient deposit, is the result of the first rainy period and occurs in the ancient trough of a very large lake. As the consequence of climatic change, this lake regressed and divided into secondary lakes which finally disappeared. A new rainy period appeared afterwards over the whole of the tropical region and rains are the origin of lakes or wide swampy areas. This seems to have been followed successively by a dry period and a rainy period again. The former is characterized by a renewal of wind-erosion activity reshaping the plains and giving the present North-South oriented gentle rounded hillocks. The latest rainy (or present) period is marked by the unimportant deposition of the fourth alluvial series limited to the outskirts of the wadis. *Subject Headings*: 1. Quaternary period 2. Geomorphology 3. Wind erosion 4. Climatic changes 5. Chad Basin.—A.V.

MICROCLIMATOLOGY

See also: **Environmental effects on airplane refueling** (Sartor), 12.2-38; **Microclimate of cacao** (Cornwell), 12.2-61; **Micromet. temp. measurement** (Höhne), 12.2-210.

12.2-406

551.584.5:551.510.42(794)

Edinger, James G., **Research problems on the meteorology of Los Angeles air pollution.** California. Univ. at L. A. Dept. of Meteorology, Contract Cwb-9309, [Unnumbered Report], Sept. 1958. 46 p. 19 figs., table, 14 refs. **DWB** (M10.42 C153res)—This report attempts to assess the current state of the air pollution meteorology of the Los Angeles area with a view toward discovering the most profitable course that future research on the subject should take. The material is sub-divided into three sections. The first is concerned with the large scale horizontal dimensions, transport and deformation of the body of polluted air, the second with the depth variations of the polluted layer and the third with the detailed features within the layer. *Subject Headings*: 1. Urban climates 2. Atmospheric pollution 3. Los Angeles, Calif.—*Author's abstract.*

12.2-407

551.584.5:711.4

Gregor, A., **Methoden der Klimabewertung für Siedlungs- und Erholungszwecke.** [Methods of evaluating climate for settlement and recreational purposes.] *Angewandte Meteorologie*,

3(3):65-68, April 1958. 2 figs. **DLC**—A system of point evaluation of climate for city construction and recreational purposes is described. It consisted of a numerical scale in which such meteorological elements as sunshine, precipitation, visibility, sensation of warmth, condition of soil and total weather characteristics are assigned values from 0 to 5; the maximum value for a day is 30 points. The application of this scale to the climate of Prague and to various localities in the Riesengebirge is illustrated. A similar procedure of evaluation is extended to describe localities in the light of their exposition. A scale of 1 to 5 is used and this climatic evaluation has different criteria depending upon whether the purpose is planning most suitable settlement or for classifying various points within a settlement. The former involves the following criteria: solar exposure, wind exposure, reaction of the relief and formation of inversions, active surface and atmospheric purity; the latter, in addition to those, includes temperature and cloudiness conditions and precipitation. *Subject Headings*: 1. City planning 2. Urban climates.—*I.L.D.*

12.2-408

551.584.65:551.555.9(480)

Troll, C., *Unterirdische Jahreszeitenwinde in Finnischen Åsern*. [Seasonal underground winds in Finnish eskers.] *Erdkunde*, Bonn, 13(2):150-152, May 1959. fig., 2 refs. English summary p. 150. **DWB, DLC**—The peculiar snow-free eskers in Finland's winter landscapes are discussed. The hot summer air (60°C have been measured) is stored within the esker and comes out in winter. In the summer warm air enters into the esker where the cover of sand sediment (grain size 0.2-0.02 mm) is missing and melts the snow cover where it is not protected by the insulating sand in winter. The effect on vegetation is considered. *Subject Headings*: 1. Underground winds 2. Eskers 3. Finland.—*W.N.*

CLIMATIC CLASSIFICATION

See also: Climatic indexes, N. Atlantic (Haggard, Cry), 12.2-300; Climatic zones (Senarathna), 12.2-411.

12.2-409

551.585:551.515.8

German, R. (Tübingen), *Genetische Klimaklassifikation auf der Grundlage von Luftmassentypen*. [Genetic classification of climate on the basis of air mass types.] *Naturwissenschaftliche Rundschau*, Stuttgart, 11(4):149-150, April 1958. **DWB, DLC**—A detailed summary of a paper by D. H. BRUNNSCHWEILER (*Geographica Helvetica*, Berne, No. 3:164-195, 1957) in which a classification of climate on the basis of air masses (aerosomatic classification) is presented. The aerosomatic definition of climate considers that the climate of a locality is the result of the frequency and activity of air masses to which it is exposed. Daily weather reports of 164 uniformly distributed stations in the Northern Hemisphere for the period 1933-1937 and 1949 were classified according to the incidence of air mass types. The frequencies of the air mass types for January, March, May, June, September and November were represented on maps. And the proportion of weather at every station influenced by a given air mass is determined. This technique provides a rather good classification of Central Europe which is a typical transition region between mP, cP and mT-air masses; namely, winter mP/mT/cP and summer mT/cP/mP. The classification of the Mediterranean region and FLOHN's critique of air mass climatic classification are discussed. *Subject Headings*: 1. Climatic classifications 2. Aerosomatic classification 3. Central Europe.—*I.L.D.*

12.2-410

551.524.32:551.585.53:577.4(584.1)

Nechaeva, N. T., Zima v Kara-Kumakh. [Winter in the Kara Kum.] *Priroda*, Moscow, No. 12:125, Dec. 1958. **DLC**—Winter in the Kara Kum, depending upon temperature and snowfall, differs from year to year. The mean monthly temperature is usually above freezing and growth of plants does not cease. Rarely do individual days have a temperature of -20° or -25°C. During warm winters spring annuals emerge in the beginning of winter. In cold winters growth of annuals begin in late winter. Not only grasses but also shrubs begin to grow in favorable winters; buds may appear as early as January. In the southeastern Kara Kum fall-winter vegetation was observed in 7 years and was absent in 5 years of a 12-year observation period. In four cases insufficient moisture in the soil and not cold accounted for failure of

growth. In the southeast Kara Kum, 70% of the years observed were favorable for fall-winter vegetation; in the northern Kara Kum (Zaunguz'e) only 10-15% were favorable. In southeast Turkmenistan the winter is 80 days long—Dec. 11 to March 1; in the northeastern part it is 105 days—from Dec. 1 to March 4. *Subject Headings*. 1. Desert winters 2. Desert ecology 3. Winter temperatures 4. Kara Kum, Turkmen, S.S.R.—I.L.D.

BIOCLIMATOLOGY

See also: Cold region bioclimatology (Lepikhin), 12.2 15; Bibliog. on zoological bioclimat., 12.2-29; Bibliog. on phytological bioclimat., 12.2 30; Rainfall effects on tobacco production (du Plessis), 12.2-57; Drought effects on sugar beet yield (Geslin), 12.2-58; Weather effects on pastures (Neuvy, Bligoud), 12.2-59; Weather influences on copra content (Ziller), 12.2-60; Weather influence on efficiency of plant sprays (Riepma), 12.2-62; Fire weather (Mc Arthur), 12.2-67; Periodicity of certain diseases (Novák), 12.2-69; High altitude effects on man (Verzár), 12.2-70; Weather effects on man (Becker), 12.2-71; Weather effects on disease (Daubert), 12.2-72; Discomfort indexes (Hevener), 12.2-372.

12.2-411

551.586:551.451

551.585.9:551.588.2 (548.7)

Senaratna, S. D. J. E. (*Botany Dept., Dept. Agric., Peradeniya, Ceylon*), Regional survey of the grasslands of Ceylon. (In: UNESCO, Study of tropical vegetation: proceedings of the Kandy Symposium, Kandy, Ceylon, March 1956. Paris, Unesco, 1958. p. 175-182. bibliog. p. 182 (16 refs.). French summary p. 181.) DWB (M86:580 U581st)—The physical features, extent and location, climatic factors and vegetation of the grassland of Ceylon are discussed. The four climatic zones of Ceylon are described in detail according to their elevations. The article discusses present taxonomy in the country. *Subject Headings*: 1. Grassland bioclimatology 2. Climatic zones 3. Ceylon.—N.N.

UPPER AIR CLIMATOLOGY

See: High altitude effects on man (Verzár), 12.2-70.

ENVIRONMENTAL INFLUENCES

See: Forest effects on water regime (L'Vovich), 12.2-63; Forest effects on runoff (Onufrienko), 12.2 165; Forest hydrology, Emme Valley (Casparis), 12.2-173; Orographic effects on temp. (Sekiya), 12.2-332; Orographic effects on air flow (Long), 12.2-350; Grasslands bioclimatology (Senaratna), 12.2-411.

SYNOPTIC CLIMATOLOGY

See: Synoptic climat., Germany (Hoffmeister), 12.2-331.

MISCELLANEOUS

VISIBILITY

See also: Airport visibility (Holzworth), 12.2-34; Airport visibility (Thomas), 12.2-35; Visibility measurement techniques (Slootmaekers), 12.2-40; Visibility measurement (Piatovskaia), 12.2-225; Visibility (Middleton), 12.2-418.

12.2-412

551.501:551.591

Boldyrev, N. G. and Barteneva, O. D., Metodika izmereniia meteorologicheskoi dal'nosti vidimosti po kontrastam udalennykh ob'ektov. [The methodology of measuring the meteorological visibility range on the basis of contrasts of distant objects.] *Meteorologiya i Gidrologiya*, Leningrad, 10:50-53, Oct. 1958. 2 tables, 10 refs., 5 eqs. DWB, DLC—The meteorological

distance of visibility is determined by the formula

$$S = \frac{\ln 1/\epsilon}{\ln K_0 - \ln K} l$$

where K_0 = true contrast of an object with the background of the sky at the horizon, K = contrast measured by atmospheric haze, l = distance between the observer and object, ϵ = threshold of sensitivity contrast of the eye equal to 5%. Since the results of S determined with this formula are not equivalent each observation must be weighted. This weight is

$$P = \frac{\ln K_0 - \ln K}{\ln 1/\epsilon}$$

then the mean value of the meteorological visibility distance S determined from a series of observations will be computed by $S = \Sigma l / \Sigma P$ where the numerator = sum of distances to all objects serving to determine meteorological visibility distance and the denominator = sum of corresponding values of P . The investigation of the precision of observations of meteorological distance was carried by a new method involving the assumption of (1) $l_1 < S < l_2$ where S = true meteorological visibility distance, l_1 = distance to the farthest visible object and l_2 = distance to the nearest visible object and (2) local inhomogeneities of atmospheric turbidity are lacking and the invisible object has sufficiently large dimensions and contrast. The magnitude of the curve of an individual measurement is computed by

$$S = \frac{\Delta S}{S} \sqrt{p}$$

where ΔS = deviation of an individual determination for one of the objects from the mean value determined for several objects. It is shown that the mean square error $\Delta S/S$ for $p=1$ does not depend upon the method of arrangement in groups so that the equation for determining weighted observations is correct and the above equation for S is necessary to determine meteorological visibility distances. *Subject Heading: 1. Visibility measurement techniques. —I.L.D.*

12.2-413

551.591:551.593.54(98)

Mitchell, J. Murray, Jr. (*Office of Climat., U. S. W. B., Wash., D. C.*), **Visual range in the polar regions with particular reference to the Alaskan Arctic.** (In: *Polar Atmosphere Symposium, Oslo, July 2-8, 1956, Proceedings, Pt. 1, Meteorology Section.* N. Y., Pergamon Press, 1958. p. 195-211. 13 figs., 14 refs. Also issued in *Journal of Atmospheric and Terrestrial Physics, London, Special Supplement, Pt. 1, 1957.* p. 195-211. DWB, DLC—Some characteristics of the polar atmosphere as related to the visual range, are discussed. Its high optical transparency is attributed to the negligible dust and low water vapor content. Formation of clouds below and above the tropopause is considered. Arctic large scaled patches of haze may be encountered from the surface and well above 30,000 ft. The haze which differs physically from cirrus haze at the tropopause in other latitudes is made up from particles $\leq 2m$ composition of which is undetermined. This does not affect the vertical visual range otherwise restricted about 2-5 mi. Surface inversions, ice-fogs, advective fogs, sea smoke and very local influences of human activities upon the visibility are noted. Counter measures mentioned are such as dry-ice seeding, use of strong wind machines and prophylactic measures vs. air pollution. Meteorological data are given in graphs and exemplified by photographs of local situations. *Subject Headings: 1. Visibility in Arctic 2. Optical density of haze 3. Alaskan Arctic. —W.N.*

12.2-414

551.591.361:551.558.29:551.557.5(262,451.2)

Bossolasco, M. and Cicconi, G., **Le condizioni di eccezionale visibilità sul Mar Ligure del 17 Ottobre 1958.** [Conditions of exceptional visibility over the Ligurian Sea, Oct. 17, 1958.] *Geofisica e Meteorologia*, Genoa, 7(3/4):75-81, May/Aug. 1959. 3 figs., 2 tables, 7 refs., 3 eqs. Italian and English summaries p. 81. DWB—After the analysis of the meteorological situation of the 16th and 17th Oct. 1958, the exceptional visibility that occurred

particularly on the second day above the Ligurian Sea is explained as the subsidence-effect of an arm of the jet stream after its passage over the western Alps, determining a flow of dry and cold air; also the micrometeorological conditions that blocked or strongly reduced the vertical transport of water vapor and the thermal convection from the sea surface are discussed. Finally, the results of the solar radiation measurements on 17th Oct. 1958 are reported and analyzed; and they confirm the great transparency of the lower troposphere. *Subject Headings:* 1. Exceptional visibility 2. Vertical motion 3. Jet stream effects on visibility 4. Ligurian Sea.—*Authors' abstract.*

OPTICAL PHENOMENA

See also: Arctic whiteout (Fritz), 12.2-10; Optical phenomenon, Antarctica (George), 12.2-16; Solar aureole theories (Deirmendjian), 12.2-323; Scattering of light (Walter), 12.2-325; Optical density of haze, Alaskan Arctic (Mitchell), 12.2-413.

12.2-415

551.593.1

Oblakov, F. V., *Redkoe opticheskoe iavlenie v atmosfere*. [A rare optical phenomenon in the atmosphere.] *Meteorologiya i Gidrologiya*, Leningrad, 10:42, Oct. 1958. DWB, DLC—A vertical column of white light of considerable brightness was observed on the sun on Feb. 7, 1958 at 0720 o'clock (Moscow time) at Maikop; the sun was still below the horizon and cirro-stratus clouds were visible in the sky. The column was as wide as the diameter of the sun and attained considerable height. At 0730 o'clock the sun was 1.5° above the horizon and the height of the column was 19.5° . On the right side of the sun a small colorless arc with a radius of 22° appeared; an analogous one appeared on the left side of the sun at 0734 o'clock; the height of the column was 16° . At 0740 o'clock the height of the column declined to 13° and the sun was 3° above the horizon. Upon the arcs colored false suns appeared. At 0743 o'clock the left arc became more intensely colored and the height of the column declined to 10° . At the same time, at 16° above the horizon in the direction of the sun, a C_α ridge appeared with relatively large masses. At 0808 o'clock the C_α moved toward the sun and the column and arcs became invisible. The air temperature was 10°C ; the wind was southwesterly, föhn-like and strong. A warm front was situated west of Maikop in a meridional direction; air flow at 3.0-5.5 km was westerly at 13-25 m/sec. Above the northern Caucasus there was strong warm air advection. *Subject Headings:* 1. Optical phenomena 2. Maikop, U.S.S.R.—I.L.D.

12.2-416

551.593.11 551.583.3(266,72)

Ives, Ronald L. (Beckman and Whitley, Inc.), *An early report of abnormal refraction over the Gulf of California*. *American Meteorological Society, Bulletin*, 49(4):192, April 1959. 5 refs. DWB, DLC—Examination of all known accounts of exploration and travel (including Jesuit diaries and mission records) beginning with MELCHIOR DIAZ (1540-41) shows that no primary, secondary or even third-order features have changed (such as mirages) during the past 250 years and probably not since 1540, in the vicinity of Puerto Peñasco, Sonora, Mex. Field observations by the author (1951) have shown remarkable mirages (looming) of ranges at sunset on Baja, California, usually below the horizon. The diary of JUAN MARIA SALVATIERRA, S.J. records on Monday, March 19, 1701, that just before sunset and after sunset Sierra San Pedro Maryr 110 m distant was clearly visible from a point 20 mi north of Puerto Peñasco. However, some changes have occurred in the long-period climate because trees used to grow there. *Subject Headings:* 1. Mirages 2. Climatic changes 3. Sonora, Mex. 4. Gulf of California.—M.R.

12.2-417

551.593.12:522.2

Protherce, William M., *Photoelectric studies of the scintillation of starlight*. (In: Wood, F. B., (ed.), *The present and future of the telescope of moderate size*. University of Pennsylvania Press, 1958. p. 141-153. 7 figs., (incl. photos), 12 refs.) Reprinted as Pennsylvania. Univ. Dept. of Astronomy, Contract AF 19(604)-1570, Scientific Report, No. 1, 1958. DWB (Reprint file)—Investigations of stellar scintillation or the rapid fluctuations in the apparent brightness of a star are conducted at the University of Pennsylvania. It is done by means of small and moderate sized telescopes. Results of this research will aid the investiga-

tion of astronomical problems. A description of the apparatus is given; and graphs of how it is used for the measurement of wind velocity at strong gradients, are presented. *Subject Headings*: 1. Stellar twinkling 2. Scintillation observation techniques 3. Telescopes.—*N.N.*

12.2-418

551.593.5/6(09) 551.591

†Middleton, W. E. Knowles (*Natl. Res. Council, Ottawa*), **Random reflections on the history of atmospheric optics.** *Optical Society of America, N. Y., Journal*, 50(2):97-100, Feb. 1960. 37 refs., eq. **DWB, DLC**—The history of ideas on the blue of the sky, the rainbow, and the visibility of distant objects is briefly sketched. In particular, it is shown that the theory of the horizontal visual range was largely rediscovered after about 175 years. *Subject Headings*: 1. History of atmospheric optics 2. Atmospheric optics 3. Visibility.—*Author's abstract.*

12.2-419

551.521.3:551.593.54:551.508.21(5)

†Kitaoka, T. (*Japan Met. Agency, Tokyo*), **On the "Trubungsfaktor" of the atmosphere over the East Asia observed with silver-disc pyrheliometers.** *Geophysical Magazine*, Tokyo, 29(2):173-228, March 1959. 18 figs., 5 tables, 18 refs., 14 eqs. **DWB.** Also shorter version in *Journal of Meteorological Research*, Tokyo, 10(10):899-900, Oct. 1958. 10 refs. **DWB, DLC**—This report of synoptic observations conducted over East Asia is based on a method introduced by the author, previously, for estimating atmospheric turbidity due to dust only (T_d). Represented by the formula $T_0 = 1T_w T_d$, the method is a further improvement of Linke's "Trubungsfaktor." Calculation of T_d , data and results presented in Japan in graphs and tables, for the period from 1934-1955 for many stations, is made. Some further investigations based upon the observed data together with all previous data, are reported. It is established that the method is very useful for air mass analysis and also for analysis of local and general atmospheric circulation. The movements of continental (from Manchuria) and local dusts were made clear by the new Trubungsfaktor T_d . The year to year variation of T_d was recognized in a wide area of East Asia and might be due to a similar variation of some fine dusts in the upper atmosphere over a wide area of the globe. *Subject Headings*: 1. Turbidity factor 2. Dust measurement with pyrheliometers 3. Japan 4. East Asia.—*I.S.*

12.2-420

551.593.54(495)

†Macris, George Jac. (*Natl. Obs., Athens*), **Atmospheric turbidity at Athens, Greece.** *Monthly Weather Review*, Wash., D. C., 87(11):401-408, Nov. 1959. 5 figs., 2 tables, 21 refs., 3 eqs. **DWB, DLC**—The turbidity of the cloudless sky at Athens, Greece, is investigated by means of pyrheliometric measurements made with No. 116 Kipp-Zonen pyrheliometer at the National Observatory, Athens. The measurements are based on observations of the direct sun radiation using two filters (red and yellow) and without a filter. The monochromatic turbidity is defined and used to compare the atmospheric transmission at Athens with the theoretical value for a Rayleigh (molecular) atmosphere. The results give an indication of the unique clarity of atmosphere in the Attica area. *Subject Headings*: 1. Turbidity 2. Pyrheliometric data 3. Athens, Greece.—*Author's abstract.*

12.2-421

551.593.55:551.510.53:535.33:546.33

Donahue, T. M., **Determination of upper atmosphere sodium abundance from D_2/D_1 measurements in twilight.** *Physical Review Letters*, N. Y., 1(8):287-288, Oct. 15, 1958. 7 refs. **DLC**—Upper atmospheric sodium abundance values derived from measured intensity ratios of the two D lines are reported to have shown poor agreement with those calculated from absolute intensity measurements (the measurements were made at Saskatoon, Canada and sodium abundance calculated by means of Chandrasekhar's theory). Reasons for this discrepancy (shadow of the ozonosphere and troposphere, angular effect of solar depression, scattering by the lower atmosphere) are discussed. *Subject Headings*: 1. Sodium in atmosphere 2. Twilight spectra.—*G.T.*

12.2-422

551.593.63

Scorer, R. S., **The Parry arc.** *Weather*, 10(2):64, Feb. 1955. **DWB**—Account of halo display seen from London on Feb. 25, 1953, with mock-suns and various arcs including Parry arc. *Subject Heading*: 1. Halo observations.—*C.E.P.B.*

12.2-423

551.593.63

Visser, S. W., **Christiaan Huygens en de Stockholmse halo van 20 april 1535.** [Christiaan Huygens and the halo at Stockholm on April 20, 1535.] *Heemel en Dampkring*, The Hague, 58(4):89-94, April 1960. 3 figs. DWB, DLC—A painting from 1535 represents one of the oldest sights of Stockholm and shows a very characteristic halo over the town. This phenomenon has been found in the works of CHR. HUYGENS *De Coronis et parhelis*. DR. P. HULSHOFF made a study and explains how HUYGENS got this picture. The author gives some very important details of the represented halo phenomenon on the painting and on some engravings of other artists. *Subject Headings*: 1. Halo phenomenon 2. Stockholm, Sweden 3. Huygens, Christiaan.—A. V.

ELECTRICAL PHENOMENA

See also: **Ionic theory of condensation nuclei** (Nikandrov), 12.2-384.

12.2-424

551.594

Dolczalek, H., **Bemerkungen zum repräsentativen Charakter Luftelektrischer Elemente, Messorte und Messverfahren.** [Some remarks on the representative characteristics of atmospheric electricity elements, measuring points and methods.] (In: Israël, H. (ed.), *Luftelektrizität im A.G.I.: Bericht über die Tagung in Aachen am 11.-12. Mai 1956.* pub. Aachen, 1957. p. 62-71. 16 refs. German and English summaries p. 62. English transl. p. 66-70.) DWB—A condensed form of the original paper is given here. The purpose is to show the difference between "falsifications" and "disturbances" as related to measurements and analysis. The first expression denotes measuring errors, the second designates what is left when the former is deducted. Hence, measuring methods and selection of stations play dominant roles in the question of representativity of atmospheric electrical measurements and the character of the representativity differs principally in regard to two possibilities for either individual or mean values. *Subject Heading*: 1. Atmospheric electricity measurement.—W.N.

12.2-425

551.594:551.507.352

Sagalyn, Rita (C.), **The use of aircraft in atmospheric electric investigations.** (In: Israël, H. (ed.), *Luftelektrizität im A.G.I.: Bericht über die Tagung in Aachen am 11.-12. Mai 1956.* pub. Aachen, 1957. p. 81-83. 6 refs. Summary only.) DWB—The use of aircraft makes possible systematic 3-D electrical and meteorological measurements, under a variety of conditions. Physical and other characteristics of the exchange layer and above its top are more advantageously examined by reconnaissance flights than from mountain stations. The hope is expressed that aircraft observations will be adequately utilized in the study of atmospheric electricity during the IGY period. *Subject Headings*: 1. Airplane observation of atmospheric electricity 2. Atmospheric electricity measurement by airplane.—W.N.

12.2-426

551.594.11

Clark, John F. (U. S. Naval Res. Lab., Washington 25, D. C.), **The fair-weather atmospheric electric potential and its gradient.** *Conference on Atmospheric Electricity, 2nd, Portsmouth, N. H., May 1958, Proceedings*, issued 1958. p. 61-73. 9 figs., table, 18 refs., 5 eqs. DWB (M(055) C748pr)—The fair weather potential gradient and other atmospheric properties were measured between 0.015 and 6 km above locations from Greenland to Key West, using a four-engine P4Y airplane. The gradient was always positive, and above 3 km it decreases exponentially. Lower-altitude condensation nuclei concentrations accompanied by smaller conductivities and larger potential gradients produce positive space charge in, and compensating negative space charge below many temperature inversions. From analysis of 22 integrated potential distributions with altitude, the total atmospheric potential has a stable mean value of $290 \text{ kV} \pm 10\%$. The potential varies diurnally about this mean in a manner which is described accurately by the *Carnegie* average ocean surface potential gradient values. *Subject Headings*: 1. Atmospheric potential gradient 2. Potential gradient measurements.—Author's abstract.

12.2-427

551.594.13 621.385.1

†Pötlz, H. and Richter, K., **Zur Theorie der raumladungsbegrenzten Diode.** [Theory of the space charge limited diode.] *Archiv der Elektrischen Übertragung*, Stuttgart, 14(5):225-234, May 1960. 6 figs., 24 refs., eqs. German and English summaries p. 225. **DLC**—A simplified theory of one-dimensional electron flow is based on the macroscopic transport equations of particle density and momentum (hydrodynamical fundamental equations). A comparison of different approximation methods suggests the assumption of constant kinetic temperature. On this assumption, the equations of the space charge limited diode can be solved analytically for the stationary as well as for the non-stationary case without further approximation. The different types of isothermal flow are discussed. The boundary conditions for the admittance problem are found by considering the space charge density in the cathode plane. The solutions of the stationary case are in good agreement with Langmuir's theory. The diode admittance calculated for arbitrary frequencies is compared with some experimental results. It turns out that a fair approximation could be achieved also in this case. *Subject Headings:* 1. Electronic discharge 2. Transport equations of particle density and momentum 3. Ion mobility.—*Authors' abstract.*

12.2-428

551.594.21:551.515.4:551.576.1

Chapman, Seville (*Cornell Aero. Lab., Buffalo*), **Koronaentladung, Luftelektrizität und Gewitterwolken.** [Corona discharge, atmospheric electricity and thunderclouds.] (In: Israël, H. (ed.), *Luftelektrizität im A.G.I.: Bericht über die Tagung in Aachen am 11.12. Mai 1956.* pub. Aachen, 1957. p. 41-44. 11 refs., eqs.) **DWB**—Comprehensive studies and experimentation in field and laboratories are discussed. The results show that the values of the electric field in thunder clouds are by far greater than those obtained by balloon measurements. By way of a typical corona current measured to 200×10^{-6} Amp. and for 1500×10^{-6} Amp. the field is respectively 90,000 and 230,000 volt/meter. Hence agreement between aircraft measurements and corona current field measurements is established. Other experiments involving a portable "field mill" and a radioactive collector show the electrical field and the wind velocity influences upon the intensity of the current. *Subject Headings:* 1. Corona discharges 2. Thunderclouds 3. Thunderstorm electricity.—*W.N.*

12.2-429

551.594.21

Tamura, Yuichi (*Geophysical Inst., Kyoto Univ.*), **Investigations on the electrical structure of thunderstorms.** *Conference on Atmospheric Electricity, 2nd, Portsmouth, N. H., May 1958, Proceedings*, issued 1958. p. 269-276. 6 figs., 7 refs. **DWB** (M(055) C748pr)—Results of the simultaneous observation of the thunderstorm electric field at eight stations during summer of 1957 are summarized. The position of the center and the magnitude of the negative charge neutralized by a cloud-ground discharge is given. The electric moment of an intra-cloud discharge and the height of charge separation in cloud is also given. A tentative model of electrical structure of thundercloud is derived. *Subject Heading:* 1. Thunderstorm electricity.—*Author's abstract.*

12.2-430

551.594.253:551.574.1

Mühleisen, R. (*Max-Planck-Inst. für Aeronomie, Weissenau, Germany*), **The influence of water on the atmospheric electrical field.** *Conference on Atmospheric Electricity, 2nd, Portsmouth, N. H., May 1958, Proceedings*, issued 1958. p. 213-222. 13 figs., 2 tables, 14 refs. **DWB** (M(055) C748pr)—It has been shown and proved by experiments that there is a relation between the atmospheric electrical phenomena during the formation of mist and fog, the sunrise effect, and the generation of electrical charges during the evaporation and condensation of water. The water molecule leaving a surface must be negatively charged in part. The physical process however needs more detailed investigations which will be worth doing in view of further consequences. *Subject Headings:* 1. Atmospheric electricity 2. Electrical charges on drops 3. Condensation processes.—*Author's abstract.*

PART II. BIBLIOGRAPHY ON THE PHYSICS OF AURORAS

Compiled by: Andrew J. Meglis

INTRODUCTION

The present bibliography covers material on the physics and chemistry of auroras withheld from the bibliography on general and descriptive aspects of the auroras published in the January 1961 issue of *Meteorological and Geostrophysical Abstracts*. A small number of items of a more general nature which were received too late for inclusion in the former bibliography have been included herein in order to make the completed two-part bibliography as exhaustive as possible for material published through December 1960. Obviously there is a great deal of pertinent material which has not yet been received, or which is in process at this time, which cannot be included because of time limitations.

The two current bibliographies, comprising 436 items, combined with the two published in October 1953 and March 1954, respectively, make a total of 947 references to literature on the aurora which have been published in four separate issues of *Meteorological Abstracts*. These, combined with 304 items on the airglow, published in the February 1957 and November 1960 issues, make a grand total of about 1250 items devoted to this important field of research on the high atmosphere. The details of these publications are as follows:

Bibliography on Auroras	Vol. 4, No. 10, Oct. 1953	248 items
Bibliography on Physics of Auroras	Vol. 5, No. 3, March 1954	263 items
Bibliography on Airglow	Vol. 8, No. 2, Feb. 1957	162 items
Bibliography on Airglow	Vol. 11, No. 11, Nov. 1960	142 items
Bibliography on Auroras	Vol. 12, No. 1, Jan. 1961	252 items
Bibliography on Physics of Auroras	Vol. 12, No. 2, Feb. 1961	184 items
Grand Total.....		1251 items

The Subject and Geographic Outlines which follow indicate the nature of the material included and the variety of locations from which observations were made.

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551.590.21:551.594.5:551.510.535:523.7

Akademiia Nauk SSSR. Komissiiia po Issledovaniui Solntsa, **Fizika solnechnykh korpuskularnykh potokov i ikh vozdeistvie na verkhniuiu atmosferu zemli.** [Physics of solar corpuscular currents and their effect on the upper atmosphere of the earth.] Moscow, Akademiia Nauk SSSR, 1957. 289 p. figs., refs., eqs. (All articles abstracted separately.) **DLC** (QB531.A5)—A collection of 20 articles (presented at a conference held at Moscow on Nov. 22-24, 1955 by the Commission on Solar Research) on various aspects of the effect of solar corpuscles on the earth's atmosphere, solar and geomagnetic field, ionosphere, aurora, airglow, cosmic rays, etc. Methods of measurement (photometry, radio, propagation, spectrometry), interpretation of spectra and theoretical models deduced from studies are discussed in connection with the 5 sessions. IGY stations for such studies are shown on maps and the hopes for progress during IGY expressed in many of the articles. (Same

item as 10.6-3, *Met. Abstracts.*) *Subject Headings:* 1. Solar corpuscular influences on upper atmosphere 2. Solar-ionospheric relationships 3. Auroral physics.—M.R.

12B-2

550.385.4 551.594.5

Alfvén, Hannes (*Royal Inst. of Tech., Stockholm*), **Magnetic storms and aurorae.** *Maryland. Univ. Institute for Fluid Dynamics and Applied Mathematics, Lecture Series*, No. 31, Feb. 1954. 38 p. 11 figs., 8 tables, numerous eqs. **DWB**—A systematic discussion of the origin of the earth's magnetic field, its characteristics, variations (secular, quiet day, magnetic storm, and other types), morphology of magnetic storms, the aurora, theories of magnetic storms and the aurora, the electric field theory, terrella experiments, motions of charged particles in a dipole field under the influence of an electric field, currents produced by the trochoidal motion of charged particles, the current system, the development of a magnetic storm, deformation of the front, surface, current across the y - z plane, production of a space charge and currents along the lines of force. Models and samples of records are appended. The circular ring current of CHAPMAN is assumed to be impossible but a trochoidal path probable. (*Same item as 8.3-332, Met. Abstracts.*) *Subject Headings:* 1. Magnetic storms 2. Auroras 3. Ring current theory.—M.R.

12B-3

551.594.51:523.1

Alfvén, H. (*Royal Inst. of Tech., Stockholm*), and Chapman, S. (*Queen's College, Oxford*), **Theories of the aurora.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 30:391-401, July 1954. 19 refs. **DLC**—Several types of auroral theory are discussed but the most likely one is said to involve the assumption that the upper atmosphere participates in the auroral discharge, so that the latter is not independent of atmospheric winds, etc. as would be the case if the aurora were caused by solar corpuscles alone. The corpuscular emission field from the sun may carry with it a magnetic field from the sun (much more intense than assuming the inverse cube law) which could induce an electric field strong enough to produce a discharge. Interplanetary winds may, therefore, exist in connection with magnetized plasma or beams from the sun and aurora or magnetic disturbances may be indications of the force of this wind. A lively discussion follows. (*Same item as 7.2-278, Met. Abstracts.*) *Subject Headings:* 1. Auroral theories 2. Interplanetary winds.—M.R.

12B-4

551.594.51 550.385.4

Alfvén, H. (*Roy. Inst. of Techn., Stockholm*), **On the electric field theory of magnetic storms and aurorae.** *Tellus*, Stockholm, 7(1):50-64, Feb. 1955. 10 figs., 12 refs., numerous eqs. **DLC**—The electric field theory is discussed and further developed. The basic assumption of the theory is that the sun emits beams of rarefied ionized gas which are electrically polarized. The electric field of the beam produces a discharge of Malmfors-Block's type around the earth. At the same time the electric field produces a variation in the cosmic ray intensity. The theoretical treatment starts by an analysis of the motion of charged particles in the equatorial plane of the earth under the action of the electric field. This phenomenon is supposed to be of basic importance. The motion produces space charge in certain regions. This charge is supposed to leave the equatorial plane along the magnetic lines of force. These two basic assumptions, which are supported by the model experiments, lead to a theory which gives a fairly good picture of magnetic storms and aurorae. In the earlier presentation of the theory the inertia of the beam was neglected. The theory gave a description of the mean phase of a storm. The motion in the equatorial plane produces a clockwise ring current at about 7 earth-radii from which a discharge to the auroral zones takes place. In the present paper also the inertia of the beam is taken into account. The result is that a second ring current is produced, which flows anti-clockwise at about 30 earth-radii. This current which seems to account for the initial phase of a storm, should be associated with an "inner auroral zone" with a polar distance of 5° - 10° . The importance of observing aurora and magnetic disturbances in this region is stressed. (*Same item as 6.10-282, Met. Abstracts.*) *Subject Headings:* 1. Auroral theories 2. Magnetic storm theories 3. Alfvén's theory 4. Electric field theory of auroras.—*Author's abstract.*

12B-5

551.594.51:550.388.8

Alfvén, H., **Line currents in cosmic physics.** *Royal Society of London, Proceedings, Ser. A*, 233(1194):296-298, Dec. 29, 1955. 4 refs., eq. **DWB**—A statement of the importance and complexity of magnetohydrodynamics in gases, especially the ionosphere. Examples mentioned are the current along the auroral zone during a magnetic storm, the ray structure of the aurora, solar prominences and the electro-jet. (*Same item as 7.9-268, Met. Abstracts.*) *Subject Heading:* 1. Magneto-hydrodynamics.—C.E.P.B.

12B-6

551.594.51:550.385.4

†Alfvén, H., **On the theory of magnetic storms and aurorae.** *Tellus*, Stockholm, 10(1):104-116, Feb. 1958. 5 figs., 25 refs., 8 eqs. **DWB, DLC**—A Chapman-Ferraro's theory of magnetic storms

is discussed. It is pointed out that the fundamental assumption about a nonmagnetized beam is in conflict with cosmic ray evidence. It is further shown that there is a fundamental objection against any theory of the main phase based on a nonmagnetized beam. B) The objections, which COWLING and CHAPMAN have raised against the electric field theory, are discussed, and the discharge mechanism during a magnetic storm is analyzed. When a magnetized beam enters the earth's magnetic field, it is heated due to the compression. In the hot plasma the earth will act as a "probe" so that it gets a negative charge in relation to the plasma. As a result of ambipolar diffusion to the earth, the ionosphere in the auroral zones will be bombarded by high energy protons and electrons. It is shown that a mechanism of this type is not subject to the objections which have been raised. (*Same item as 10.3-331, Met. Abstracts.*) *Subject Headings: 1. Magnetic storm theories 2. Auroral theories.—Author's abstract.*

12B-7

551.594.51:539.17:546.291

Altshuler, Saul, **Excitation cross-sections for helium atoms.** Iowa. State College. Physics Dept., Contract AF 19(122)-469, Research Report, No. 1, Sept. 1952. 14 p. 7 figs., refs., eqs. DWB—The excitation scattering of electrons from helium atoms is investigated in order to examine quantitatively the errors introduced by the fact that the description of the helium target is only approximately known. The cross-section is calculated in Born approximation using formally equivalent matrix elements which weight the wave functions differently in space. Similar shapes for angular distribution and total cross-section vs. energy curves are obtained for transitions to the P states investigated, although absolute values differ. For the transition to the metastable 2S state, angular distributions vary more greatly, but the similarity in the total cross-section vs. energy curves remains. *Subject Headings: 1. Auroral spectra 2. Helium.—Author's abstract.*

12B-8

551.594.5 550.385.4

Åström, Ernst (*Royal Inst. of Tech., Stockholm*), **On the theory of magnetic storms and aurorae.** *Tellus*, Stockholm, 8(2):239-240, May 1956. ref., 17 eqs. DLC—The drift motion of the ionized gas from the sun can be divided into three terms, namely: one resulting from crossed electric and magnetic fields, one from the inhomogeneity of the magnetic field and one from the inertia of the charged particles. "In the region where the magnetic field from the sun and earth is the same order of magnitude, the current due to drift in crossed fields and that due to inertia form a circular current round the earth." A mathematical proof of this statement, made by H. ALFVÉN, is presented. (*Same item as 9.4-274, Met. Abstracts.*) *Subject Headings: 1. Magnetic storms 2. Auroras 3. Auroral theories.—I.L.D.*

12B-9

551.594.51:551.521.326

Bagariatskiĭ, B. A. and Fedorova, N. I. (*both, Geophysical Inst. Acad. of Sci., Moscow*), **Spectra of the aurora and night-airglow in the infra-red region up to 11,800 Å.** (In: *The airglow and the aurorae: a symposium.* London, Pergamon, 1956. p. 174-177. 2 figs., 9 refs.) DWB—Spectra of auroras obtained with an infrared image converter in conjunction with a grating spectrograph show that at wave lengths greater than 9000 Å, the Meinel N₂⁺ system is the only feature revealed by short exposures. It is tentatively suggested that the vibrational numbering given to the N₂⁺ bands by MEINEL and DOUGLAS may require revision, as there is no indication of a zero band at about 11,100 Å on the spectrograms obtained up to the present. An anomalous increase in intensity in the P branch of the (4,1) OH band in the night airglow during intense auroral displays is thought to be due to some additional emission, possibly the (²D—²P) lines of [NI] at 10,398 Å and 10,407 Å. (*Same item as 8B-136, Met. Abstracts.*) *Subject Headings: 1. Night airglow infrared spectrum 2. Auroral spectra.—Authors' abstract.*

12B-10

551.594.51:535.33:546.11

†Bagariatskiĭ, B. A., **Vodorodnaia emissiia v spektrakh poliarnykh siianiĭ.** [Hydrogen emissions in auroral spectra.] *Uspekhi Fizicheskikh Nauk*, Moscow, 65(4):631-665, 1958. 22 figs., 5 tables, 39 refs., 23 eqs. DWB—A thorough technical review of the recent literature on hydrogen lines in the auroral spectra and related problems. The empirical data are first analyzed and systematically reviewed (with tables, graphs and outlines). Then the theory is exhaustively treated, with many theoretical curves and cross sections by various authors reproduced. Variations with geographic latitude and longitude, height, season and solar or geomagnetic conditions are noted. Of the 39 articles cited 8 are from Russian and 31 from western sources. (*Same item as 10.10-303, Met. Abstracts.*) *Subject Headings: 1. Auroral spectra 2. Auroral hydrogen lines.—M.R.*

12B-11

551.594.51:546.11

Bagariatskiĭ, B. A. and Gal'perin, Iu. I. (*both, Acad. Sci., U.S.S.R.*), **On hydrogen line profiles in the spectra of aurorae.** *Soviet Astronomy AJ*, New York, 3(1):196-197, Jan./Feb. 1959. 7 refs. DLC. Transl. of original Russian in *Astronomicheskii Zhurnal*, Moscow, 36(1):192-193, Jan./Feb.

1959. **DLC**—The average hydrogen emission profile observed in auroras is compared with theoretical calculations made by the present authors. *Subject Heading: 1. Auroral hydrogen lines.*—*Authors' abstract.* ⑤

12B-12

551.506.22:551.594.5(699.13)

Barbier, D., *L'observation des aurores à Port-aux-Français*. [Auroral observation at Port-aux-Français.] *France. Ministère de la France d'Oulre-Mer, Terres Australes et Antarctiques Françaises*, No. 10:56-60, Jan./March 1960. 2 figs. **DLC**—Survey of the auroral observation program during the International Geophysical Year in the Kerguelen Archipelago, and description of the methods used at the station Port-aux-Français. The author gives a more detailed description and discusses the possibilities of the photometer for the recording of auroral intensity. The photometric observations are, after being processed, condensed in monthly tables and presented on graphs. The results obtained from the analysis of observations have been sent to the IGY-World Centers. *Subject Headings: 1. Auroral observations 2. IGY auroral program 3. Port-aux-Français, Kerguelen Island.*—A.V. ⑤

12B-13

551.594.52:551.521.64

Barbier, D. and Glaume, J., *Sur l'existence possible de nouvelles zones aurorales*. [The possible existence of new auroral zones.] *Académie des Sciences, Paris, Comptes Rendus*, 250(11): 2043-2044, March 14, 1960. 5 refs. **DWB, DLC**—The appearance frequency of Polar auroras attains its maximum in two zones situated at a distance of about 20° from the geomagnetic poles. Observations of the light of the night sky made at Tamanrasset suggest the existence of two new auroral zones in low latitude regions. Records made through filters centered on 6300 Å and 5577 Å are characterized by the presence of two intensity maxima practically symmetric with regard to the meridian. These maxima should be ascribable to the presence in the sky of an arc in which the emission of the lines 6300 and 5577 Å should be reinforced. The fact that the arc emits simultaneously the red line and the green line of oxygen suggests that it is situated at a fairly high altitude—at least 150 km—and that it is due to an electronic excitation. The arc observed at Tamanrasset might be explained by an escape of electrons from the inner Van Allen belt. The observers estimate that there exist two auroral arcs. In January, one of them should be at a geomagnetic latitude of about 20°N and the other one near the equator. In July, the arcs are supposed to be displaced: the former to be near the equator and the latter at a latitude of 20°S. *Subject Headings: 1. Auroral zones 2. Auroral arcs 3. Van Allen belts 4. Tamanrasset, Algeria.*—A.V. ⑤

12B-14

551.594.53(4)

Bartha, Lajos, Jr., *A sarkifény gyakorisága Középeurópában*. [Frequency of auroras in Central Europe.] *Időjárás*, Budapest, 57(4):228-234, July/Aug. 1953. 7 figs., 2 tables, 9 refs., 2 eqs. Russian and French summaries p. 228. **DLC**—The data sources of auroras used in this study are: a) a list of auroral observations by H. FRITZ (1873) and b) yearly auroral summaries in the periodical *Sternnewelt* (1949-1951). From these sources the author analyzes the auroral observations made in middle latitudes (45-55°N) during the periods 1770-1871 and 1948-1950. Short (24-hour and 27-day) and long (1-year and 11-year) periodicities in Central Europe and in Hungary are investigated. The relation between the durations of the sunspot cycle (R) and the auroral cycle (Sp) is expressed as $Sp = R - 4.8/0.6$. Maps of the average frequency distribution of auroras in Central Europe and of the frequency distribution during sunspot maxima and minima are drawn. The author believes that these maps are an improvement over those presented by FRITZ. The increase of the frequency of auroral observations (Sq) with geographic latitude (φ) is found to follow the relation $\log Sq = \varphi - 41.1/4$. (Same item as 5.8-282, Aug. 1954, *Mel. Abstracts*.) *Subject Headings: 1. Auroral frequencies 2. Central Europe.*—G.T.

12B-15

551.594.51 551.510.535:541.14

†Bates, David R. (Queen's Univ., Belfast), *Atomic and molecular processes*. *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 30:321-339, July 1954. figs., 6 tables, 32 refs., 37 eqs. Discussion p. 333-337. **DLC**—Various atomic and molecular processes likely to be of importance in the high atmosphere (and particularly in the auroras) are discussed. The reactions giving rise to the main auroral emissions are considered. The importance of recombination processes (which must give a light emission comparable to that from direct excitation) is emphasized. The velocity distribution of the electrons in the auroral zone is investigated theoretically. It is found that only a minute fraction of these electrons can have energies in excess of thermal energy. The importance of this in connection with theories on the origin of aurorae is indicated. The photochemistry of certain atmospheric constituents (carbon dioxide, carbon monoxide, methane, and nitrous oxide) is investigated. Originally, the aim of this study was to obtain information on the altitude distribution of the polyatomic molecules. (Same item as 6E-149, *Mel. Abstracts*.)

Subject Headings: 1. Auroral theories 2. Recombination processes 3. Photochemistry of upper atmosphere.—From author's abstract.

12B-16

551.594.51:535.33

†Bates, D. R. (*Queen's Univ., Belfast*), **Theory of the auroral spectrum.** *Annales de Géophysique*, Paris, 11(3):253-278, July/Sept. 1955. 7 figs., 4 tables, 81 refs., 47 eqs. **DLC**—After summarizing the results of some recent work on collisions between heavy particles, consideration is given to the emission of lines of other elements which may be present in the incident stream causing an aurora. The main luminescence observed is due to (1) inelastic collisions made by the incident particles and by the ejected electrons (which may possess kinetic energy other than that given them initially), (2) degradation of the ultraviolet radiation emitted and, in the case of sunlit auroras, scattering of solar radiation, (3) thermal process such as dissociative recombination. These various mechanisms are discussed and estimates are made of the relative importance of some of them. Finally, suggestions are advanced regarding the detailed reactions responsible for the excitation of the different lines and band systems. (*Same item as 7.8-272, Met. Abstracts.*) *Subject Headings: 1. Auroral energy excitation mechanism 2. Auroral spectrography.—Author's abstract.*

12B-17

551.594.5 537.534.74

†Bates, D. R. and Dalgarno, A. (*Queen's Univ., Belfast*), **Inelastic collisions between heavy particles.** (In: *The airglow and the aurorae: a symposium.* London, Pergamon, 1956. p. 328-336. 2 tables, 63 refs., 40 eqs.) **DWB**—Studies on heavy particle collisions, which have appeared since the reviews of MASSEY and BUPHOP and of ALLISON and WARSHAW, are briefly summarized. (*Same item as 10.1-356, Met. Abstracts.*) *Subject Heading: 1. Auroral particles.—Authors' abstract.*

12B-18

551.594.51:551.521.9

Bates, D. R., (*Queen's Univ., Belfast*), **Note on the processes governing emission by incident heavy particles.** (In: *The airglow and the aurorae: a symposium.* London, Pergamon, 1956. p. 251-253. 8 refs., 21 eqs.) **DWB**—The processes which determine the intensity of the emission from any hydrogen, helium, and sodium in the primary auroral stream are briefly discussed. (*Same item as 8.10-300, Met. Abstracts.*) *Subject Headings: 1. Auroral emissions 2. Auroral hydrogen lines 3. Auroral helium lines.—Author's abstract.*

12B-19

551.594.51:546.292

Bates, D. R.; McDowell, M. R. C. and Omholt, A., **On the energy distribution of secondary auroral electrons.** *Journal of Atmospheric and Terrestrial Physics*, 10(1):51-53, Jan. 1957. figs., 5 refs., eqs. **DWB**—Report of calculations of proton impact on neon, which is sufficiently similar to oxygen and nitrogen. "It is seen that a considerable proportion of the secondary electrons of very energetic protons are able to excite spectral lines originating from high levels, and to liberate tertiary electrons." (*Same item as 8.6-368, Met. Abstracts.*) *Subject Heading: 1. Auroral spectra.—C.E.P.B.*

12B-20

551.594.5

Beiser, Arthur, **On the origin of auroral forms.** *Journal of Geophysical Research*, 58(2):275-276, June 1953. fig., ref. **DWB**—In a short note the author shows that the form of the aurora (arcs, rays, draperies, beams, etc.) could depend entirely on the zenith angle of ζ of the incident beam of particles which strike the upper atmosphere. The more nearly vertical the beam the less it will be deflected by the magnetic field and the deeper it will penetrate, whereas at $\zeta \sim \pi/2$ the stream may be deflected into a spiral orbit. The variation of luminosity L with height h , is: $L = L' \exp(1 - z - e^{-z})$, where L' is maximum luminosity and $z = (h - h')/H$, where $H (= kT/Mg)$ is the scale of length. The relation of the relative intensity L/L' with z is shown graphically for 3 zenith angles and the 3 curves agree with experimental curves for 1) arcs, 2) draperies and 3) rays. (*Same item as 8.3-333, Met. Abstracts.*) *Subject Headings: 1. Auroral forms 2. Zenith angle of incident beam.—M.R.*

12B-21

551.594.51:523.75:550.385

Beiser, Arthur (*N. Y. Univ.*), **On an interplanetary magnetic field.** *Journal of Geophysical Research*, Wash., D. C., 60(2):155-159, June 1955. 7 refs., 14 eqs. Also his: **Solar-terrestrial time delays.** *Ibid.*, 60(2):161-164, June 1955. 6 refs., 11 eqs. **DWB**—1) Considerations suggesting the existence of an interplanetary magnetic field are presented. Such a field would not exceed about 5×10^{-8} gauss, and its presence can explain the observed cutoff in the primary cosmic-ray momentum spectrum. A field existing within the earth's orbit can account for all or part of the observed solar-terrestrial time delays in aurorae and magnetic storms. The time required for the formation of a magnetic field pervading the solar system is less than 10^8 yrs, and its lifetime against decay is probably more than 10^{10} yrs. 2) The observed delay of about 24 hrs between the meridian passage of a sunspot or flare and the onset of an associated magnetic storm or aurora is shown to originate in the magnetic deflection of the ion streams involved. If a solar magnetic dipole is exclusively responsible

its moment must be between 6×10^{27} and 10^{29} gauss. Should both fields act, which is likely, then the above figures represent maxima. (Same item as 7.5-253, *Met. Abstracts*.) *Subject Headings:* 1. Interplanetary magnetic field 2. Solar-terrestrial time delays 3. Auroral physics.—*Author's abstract.*

12B-22

551.594.51

†Bennett, W. H. and Hulburt, E. O., **Magnetic self-focussed solar ion streams as the cause of aurorae.** *Journal of Atmospheric and Terrestrial Physics*, 5(4):211-218, Sept. 1954. 4 tables, 21 refs., 7 eqs. Also their: **Theory of the aurora based on magnetic self-focusing of solar ion streams.** *Physical Review*, N. Y., 95(2):315-319, July 15, 1954. 3 tables, 15 refs. DWB—It is assumed that in a jet of equal numbers of fast positive ions and negative electrons passing through the corona the fast electrons are scattered out and replaced by slow electrons. The field of the resulting current repels fast electrons and slow ions. Density of a stream sufficient to cause aurora is calculated as at least 10^{-4} electron-ion pairs per cc to support this magnetic self-focusing. Speed of auroral ions estimated as 10^{10} cm/sec. Aurora is attributed to energy transferred from ions to atmosphere and to atmospheric O and N particles blown outwards and made luminous. Article in *Journal of Atmospheric and Terrestrial Physics* is a slightly revised version of that appearing in *Physical Review*. (Same item as 6.4-339, *Met. Abstracts*.) *Subject Heading:* 1. Auroral physics.—C.E.P.B.

12B-23

551.594.5:539.1

Bennett, Willard H. (U. S. Naval Res. Lab., Wash., D. C.), **Proposed measurement of solar stream protons.** (In: Van Allen, James A. (ed.), *Scientific uses of earth satellites*. Ann Arbor, Univ. of Michigan Press, 1956. p. 194-197. 3 figs., 4 refs.) DWB, DLC—Measurements of solar protons in their free orbits and later in captive orbits (at ca 100 km) can be made only in auroral zones with an artificial satellite which would pass over the earth's poles. The equipment for measuring these solar stream protons at times of strong auroras (0 to 10^8 protons/cm²/sec) is described and illustrated. The Störmertron has been used in the laboratory to produce scale models. An ionization chamber is located at an edge of the satellite away from axis of its rotation. Both types of equipment are illustrated. (Same item as 9.6-285, *Met. Abstracts*.) *Subject Headings:* 1. Solar stream proton measurement 2. Satellite instrumentation 3. Störmertron 4. Auroral proton streams.—M.R.

12B-24

551.594.5:550.385

†Bennett, Willard H. (Nucleonics Div. USN Research Lab.), **Auroral and magnetic-storm theory.** *Astrophysical Journal*, Chicago, 127(3):731-742, May 1958. 4 figs. (incl. photos), 2 tables, 30 refs., eqs. DWB, DLC—Experimental proof that the ionized interplanetary matter near the earth has a density of the order of 500 charge pairs per cubic centimeter invalidates the old SCHUSTER, LINDBMANN, and FERRARO criticisms of charged particle-stream theories of the aurora. Experimental evidence is presented and analyzed to show that none of the neutral ionized-stream theories can account for the principal broad characteristics of the aurora and magnetic storms. Arguments are presented to show that the magnetically self-focusing solar proton-stream modification of the original Birkeland-Störmer theory (see 12B-22) accounts for the principal characteristics of auroras and magnetic storms quite naturally. Definitive tests of the proton-stream theory are proposed. (Same item as 10.8-358, *Met. Abstracts*.) *Subject Headings:* 1. Auroral theories 2. Magnetic storm theories.—*Author's abstract.*

12B-25

551.594.5 551.521.326

†Bernard, R. G. (Univ. of Lyons, France), **Excitation of the spectrum of molecular nitrogen in the laboratory in the high atmosphere.** U. S. Air Force. Cambridge Research Center, *Geophysical Research Papers*, No. 30:243-269, July 1954. 6 figs., 16 tables, 58 refs., eq. Discussion p. 261-266. DLC—Studies of the distribution of intensities of the various lines composing a band has permitted determination of an emission temperature. In night airglow studies by CABANNES and DUFAY on the Vegard-Kaplan bands, temperature $T = 230^\circ\text{K}$ approximately. VEGARD's latest measurements in auroral studies on the separation of rotational lines of the negative bands 3914 and 4278 Å indicate $T = 219^\circ\text{K}$, slightly lower than the previous estimates. Analyses of the intensity of the negative bands and the second positive bands in the aurora, together with measurements of the excitation functions in the laboratory, permit estimation of the energy of the exciting electrons (about 30 eV). (Same item as 8B-94, *Met. Abstracts*.) *Subject Headings:* 1. Nitrogen spectra 2. Auroral spectra 3. Night airglow spectrum.—*From author's abstract.*

12B-26

551.501.81:551.594.5

Bleviss, B. C. and Cameron, E. A., **Further data on radar returns from aurora at 488 Mc/s. Canada.** Defence Research Telecommunications Establishment, Report 44-2-2, July 1958. 9 p. 7 figs., ref. DWB (M(055) C212rep)—This report extends the information previously presented

(CHAPMAN, J. H. et al., *Ibid.*, Report 44-2-1, Jan. 1958) on auroral radar observations at a frequency of 488 Mc/s. The present work is concerned primarily with measurements of auroral depth in range and with observed Doppler shifts in the signals returned from the aurora. The observations were made with a transmitter located near Ottawa, Ont. (45°21'N, 75°53'W) and with the receiver located near Meath, Ont. (45°44'N, 76°59'W). The equipment used for the measurements is described with particular reference to modifications which have been made since the previous report was published. Comments are made about the auroral echo geometry and the receiver and transmitter sites. Representative photographs of visual displays are included and the results of the measurements are indicated. *Subject Heading: 1. Radar echoes from auroras.—Authors' introduction.*

12B-27

551.594.51

Block, L. (*Royal Inst. of Tech., Stockholm*), **Model experiments on aurorae and magnetic storms.** *Tellus*, Stockholm, 7(1):65-86, Feb. 1955. 20 figs. (incl. photos), 10 refs., eqs. **DLC**—Model experiments on ALFVÉN'S electric field theory of auroras and magnetic storms have been performed. The transformation laws from nature to model are considered. It is concluded that a proper scaling down of every detail in nature is not possible. Only the most significant features are scaled down properly. It is shown that a mechanism like ALFVÉN'S proposed auroral mechanism is very likely to be present in the model. In particular the conception seems to be experimentally confirmed that space charge accumulated in the discharge region, rather than destroy the whole pattern of motion, discharges along the magnetic field lines. (*Same item as 6.10-283, Met. Abstracts.*) *Subject Headings: 1. Auroral theories 2. Alfvén's theory 3. Electric field theory of auroras 4. Experimental auroras.—Author's abstract.*

12B-28

551.594.5:537.525

Block, L. (*Royal Inst. of Tech., Stockholm*), **On the scale of auroral model experiments.** *Tellus*, Stockholm, 8(2):234-238, May 1956. 2 figs., 9 refs., 17 eqs. **DLC**—The possibilities of scaling down the physical properties of gaseous discharges with altered linear dimensions are considered with special regard to model experiments on auroras. It is shown that the drift orbits can be transformed correctly, although the spiralling motion around the magnetic field lines cannot. This spiralling motion constitutes a very small ripple on the drift orbits in nature but a greater ripple in the experiments. However, this ripple seems to be of minor importance, and reasons are given for the view that the recent auroral experiments represent nature in a satisfactory way. (*Same item as 8.1-388, Met. Abstracts.*) *Subject Headings: 1. Auroral model experiments 2. Electrical discharges in gases.—Author's abstract.*

12B-29

551.594.52(43-2.1)

Böhme, W., **Nordlichtbeobachtung am 4. 9. 1958.** [Auroral observation on Sept. 4, 1958.] *Zeitschrift für Meteorologie*, Berlin, 12(9/10):310, Sept./Oct. 1958. **DWB, DLC**—The author presents an hour by hour account of an aurora which actually appeared at 2100 o'clock but which he began to observe at 2200 o'clock at a point 900 m east southeast of the meteorology observatory of Potsdam. For each hour the author gives a detailed description of the appearance of the auroral light in the sky, the colors, direction in the sky, etc. Observations were concluded at 0025 o'clock on Sept. 5. *Subject Headings: 1. Auroral descriptions 2. Potsdam, Germany.—I.L.D.*

12B-30

551.594.5:551.501.81 551.594.12:550.38

Booker, H. G., **A theory of scattering by nonisotropic irregularities with application to radar reflections from the aurora.** *Journal of Atmospheric and Terrestrial Physics*, London, 8(4/5):204-221, May 1956. 4 figs., 14 refs., 48 eqs. **DWB**—Radar echoes from aurora come mainly at low elevations from north, even at stations north of auroral visual zone. Horizontal and vertical extent of echoes increase as frequency decreases from 100-25 Mc/s. An explanation is given in terms of columns of ionization parallel to earth's magnetic field, but only about 40 m long by 1 m diameter, probably too small to be associated with visible rays. These irregularities are of the same order of size as turbulence elements and it is suggested that the magnetic field creates nonisotropic irregularities of electron density in the E region, with maxima some 100 times the normal, but this cannot explain fading of auroral echoes, which must be due to other features of auroral ionization. (*Same item as 7.10-297, Met. Abstracts.*) *Subject Headings: 1. Radar echoes from auroras 2. Geomagnetic effects on ionization.—C.E.P.B.*

12B-31

551.501.81:551.594.5:551.551

Booker, H. G. (*Cornell Univ.*), **Turbulence in the ionosphere with applications to meteor-trails, radio-star scintillation, auroral radar echoes, and other phenomena.** *Journal of Geophysical Research*, Wash., D. C., 61(4):673-705, Dec. 1956. 11 figs., 43 refs., 63 eqs. (Also in: *Polar Atmosphere Symposium*, Oslo, July 2-8, 1956, *Proceedings, Pt. 2, Ionosphere Section*, issued 1958. p. 52-81. 11 figs., etc.) These proceedings also issued as *Journal of Atmospheric and Terrestrial Physics*,

London, Special Supplement, Pt. 2 1957, pub. 1958. p. 52-81. **DLC**—Two scales of turbulence are discussed, since large eddies are responsible for forward scattering phenomena and small eddies for back-scatter. Molecular diffusion theory forms the basis for small scale eddy formulas; Richardson's number is used for the large scale eddies. Large eddies have time constants of 40 to 100 seconds; small eddies about 0.4 sec near 100 km. Large eddies have a scale of 1.6 km, small eddies about 1.3 m. The coefficient of eddy diffusion in meteor trails is less than 10 for small eddies and increases to 10^4 for large eddies. The large eddies responsible for radio star scintillation are located near 200 km. The turbulence power in watt/kg is given as 5×10^{-4} in the troposphere, 25 at the meteoric level and 1000 at the scintillation level. (*Same item as 10.8-131, Met. Abstracts.*) *Subject Headings:* 1. Turbulence in the ionosphere 2. Meteor trail radio transmission 3. Radio star scintillation 4. Radar echoes from auroras 5. Auroras.—S. Fritz.

12B-32

551.501.81:551.510.535:551.594.5:550.382.7

Bowles, K. L.; Cohen, R.; Ochs, G. R. et al. (*all, Natl. Bur. of Standards, Boulder, Colo.*), **Radio echoes from field-aligned ionization above the magnetic equator and their resemblance to auroral echoes.** *Journal of Geophysical Research*, Wash., D. C., 65(6):1853-1855, June 1960. 6 refs. **DLC**—Both classes of echoes occur in about the same height range and have about the same band width of fading and similar Doppler-shift characteristics. Both exhibit an aspect of sensitivity corresponding to the influence of the earth's magnetic field. Strong currents are observed to flow horizontally to the lines of force of the earth's magnetic field both at the magnetic equator and in auroral forms. The authors suggest that in both phenomena irregularities could reasonably consist of a family of plane-wave disturbances constrained to lie parallel to the local lines of force of the earth's magnetic field. The apparent weakness of the aspect sensitivity in both cases could be produced by local distortion of the earth's magnetic field due to the flow of strong localized ionospheric currents. *Subject Headings:* 1. Radio echoes from auroras 2. Ionospheric echoes 3. Geomagnetic-ionospheric relationships. I. Balsley, B. B.—E.Z.S. ⑤

12B-33

551.594.51:551.521.4:546.21

†Branscomb, L. M. and Smith, S. J., **Negative oxygen ions in the upper atmosphere: the affinity and radiative attachment coefficient of atomic oxygen.** *American Geophysical Union, Transactions*, 36(5):755-758, Oct. 1955. figs., eqs., 20 refs. **DWB, DLC**—The influence of negative ions of atomic oxygen on the physics of the ionosphere and night airglow is re-examined in the light of new experimental determinations of the oxygen affinity (1.48 ± 0.10 ev) and photodetachment cross section. The radiative attachment coefficient is calculated from the photodetachment cross section. There is no evidence of a resonance at the threshold, where the attachment coefficient is approximately 1.2×10^{-15} cm³/sec. (*Same item as 7.11-304, Met. Abstracts.*) *Subject Headings:* 1. Auroral physics 2. Night airglow 3. Atomic oxygen.—Authors' abstract.

12B-34

551.594.51

Brömer, Herbert Heinrich, **Untersuchung des "auroral afterglow" und seiner Präparationsstadien. I. Präparation der Entladungsröhre und Messapparat.** [Investigation of auroral afterglow and its preparatory stages, Pt. 1, Preparation of the discharge tube and measuring apparatus.] *Zeitschrift für Physik*, Berlin, 157(5):601-612, 1960. Pt. 2, [Decay of the afterglow in the airglow, NO and Lewis-Rayleigh stages]. *Ibid.*, 158(1):1-11, 1960. Pt. 3, [The decay of the auroral afterglow]. *Ibid.*, 158(2):133-141, 1960. figs., foot-refs. **DLC** (QC1.Z44)—Pt. 1 describes a special apparatus that has been developed in order to produce an auroral afterglow and to measure the decay of light intensity of some afterglow emissions over several powers of ten. The preparation of different discharge tubes during which the air, the nitric oxide, and Lewis-Rayleigh afterglow appear also is described. The corresponding spectra are given. Pt. 2 reports that the decay of the continuum of the air afterglow was found to be equal in the whole spectral range used. At the beginning of the afterglow (NO) is not constant. N atoms from the discharge create O atoms by reacting with NO and retard the intensity decay. Later (NO) remains constant during the afterglow. The decay curves measured in the nitric oxide and the Lewis-Rayleigh stage agree with current theories of recombination of N₂ and NO by three-body collision. If the spectral intensity distribution in the Lewis-Rayleigh afterglow is due to the action of different third bodies, as REINECKE (1953) suggested, then this model is to be improved by accepting a two-step reaction. The measurements can be interpreted, if the first step is responsible for the rate, and the second for the intensity distribution. No evidence could be found for the Cario-Kaplan processes to be more frequent in the neighborhood of the exciting discharge than that of recombination. On the other hand, it could be shown that the recombination of N atoms is severely hindered by transition into the auroral stage and additional collision processes become effective in the excitation of all transitions of the first positive group. Pt. 3 reports that the intensity decay of the negative bands of N₂ and of the first positive bands of N₂ has been measured. A possible explanation for the decay curves of the former is proposed: the intensity decay at the beginning of the afterglow at high ionic densities is determined

by the recombination of N_2 with electrons: later, the ambipolar diffusion of the charge carriers to the wall introduce the time dependence. A value of the ambipolar diffusion coefficient in nitrogen, derived from measurements, is given by $D_a \cdot p \cong 124 \text{ cm}^2 \text{ sec}^{-1} \text{ torr}$. The temperature of the charge carriers is estimated to be 313°K . The intensity decay of the first positive group in the afterglow seems mainly to be due to the diffusion of metastable particles to the wall. *Subject Headings:* 1. Auroral afterglows 2. Auroral physics research.—*Author's abstract.* ©

12B-35

551.594.5:551.594.7

Bullough, K. and Kaiser, T. R., **Radio reflections from aurorae, Pt. 1.** *Journal of Atmospheric and Terrestrial Physics*, 5(4):189-200, Sept. 1954. 9 figs., 3 tables, 16 refs. Also: **Pt. 2, Ibid.**, 6(4):198-214, April 1955. 18 figs., table, 11 refs. **DWB**—Pt. 1 reports that observations at Jodrell Bank with a rotating aerial system on 4.1 m included 3 occasions of auroral echo. Echo is interpreted as a reflection from the most highly ionized part of an auroral arc extending more than 1000 km along geomagnetic latitude 59° . The reflecting region was only a few km across, at a height below 125 km, moving westward at 1-2 km/sec. The movement is attributed to movement of the ionizing agent. **Pt. 2:** Observations of auroral echoes 1949-53 on a beam directed 68°W of N at Jodrell Bank are attributed to large single blobs or localized aggregates. There was a marked fall of activity in 1952-53 with decrease of sunspot activity. Echoes without discrete structure occur mainly between 16 h and 21 h, those with discrete structure between 18 h and 6 h. Annual variation shows a slight maximum in July-Oct. Geomagnetic locality, correlation with visual aurora and with magnetic activity are discussed; auroral speeds and motions are described. For Pt. 3, see 12B-36. (**Pt. 1, Same item as 6.2-339; Pt. 2, Same item as 6.8-349, Met. Abstracts.**) *Subject Headings:* 1. Radio echoes from auroras.—*C.E.P.B.*

12B-36

551.594.5:551.510.62:550.388.8

Bullough, K.; Davidson, T. W.; Kaiser, T. R. and Watkins, C. D., **Radio reflections from aurorae, Pt. 3, The association with geomagnetic phenomena.** *Journal of Atmospheric and Terrestrial Physics*, London, 11(3/4):237-254, 1957. 15 figs., 2 tables, 15 refs. **DLC**—This paper presents a further study of the radio-echo observations of auroral ionization, made on a frequency of 72 Mc/s between June 1949 and Oct. 1953, described in a previous paper of this series (BULLOUGH and KAISER, 1955, see 12B-35). The data are compared with geomagnetic observations made at Eskdalemuir during the same period. A good correlation is found between the daily frequency distribution of the radio echoes and the mean daily variation in magnetic disturbance. The change from a positive to negative bay type of disturbance tends to occur between 2100 and 2200 hr local time and coincides with a minimum in the frequency of echo occurrence. This minimum separates the diffuse echoes (from westward-moving ionization) of the evening sequence and the discrete echoes (from eastward-moving ionization) of the morning sequence. There exists a close correspondence between the occurrence of radio echoes and features in the magnetic disturbance. In a number of cases there appears to be a displacement in time between echo components and peaks in the magnetograms; it is suggested that this corresponds to the time of transit of the ionization between the reflecting region and the magnetic meridian through Eskdalemuir (some 10° in magnetic longitude to the west). The probability of occurrence of 72 Mc/s echoes during a positive disturbance is approximately double that for a negative one, being 50% for $\Delta H > 100\gamma$ and $\Delta H < -200\gamma$. The results and conclusions appear in several aspects to conflict with the Chapman-Ferraro-Martyn theory of magnetic storms and aurorae. (*Same item as 10.1-357, Met. Abstracts.*) *Subject Headings:* 1. Radio echoes from auroras 2. Auroral ionization 3. Auroral-magnetic relationships.—*Authors' abstract.*

12B-37

551.510.53 551.594.51 550.385

California Institute of Technology, **Upper atmospheric research.** Contract DA36-03-sc-34; Progress Report for the Second Quarter, July 1-Oct. 1, 1950, pub. Oct. 1, 1951. 33 p. refs. **DWB**—The field covered in this second report includes corpuscular influences, the theory of auroras and magnetic storms and meteor evidence on upper atmosphere winds. Attached are: Chapman, Sydney, **Upper atmospheric nomenclature** (also published in *Journal of Geophysical Research*, 55(4):395-399, Dec. 1950; see 2.6-40, June 1951, *MAB*) and *Idem*, **Notes on aurorae and magnetic storms, I. Considerations as to a model experiment** (also in: *Journal of Atmospheric and Terrestrial Physics*, 1(3):189-199, 1951; see 2.9-179, Sept. 1951, *MAB*). (*Same item as 6.4-111, Met. Abstracts.*) *Subject Headings:* 1. Auroras 2. Magnetic storms 3. Upper atmosphere research. I. Pickering, W. H. II. Chapman, Sydney.—*G.T.*

12B-38

550.386:551.594.51

Campbell, Wallace H. (*Geophysics Inst., Univ. Alaska*), **Magnetic micropulsations and the pulsating aurora.** *Journal of Geophysical Research*, Wash., D. C., 65(2):784, Feb. 1960. fig, ref. **DLC**—An investigation is being undertaken to determine the source of micropulsations in the earth's

magnetic field. At a site 25 mi from College, Alaska, a 2-m-diameter loop antenna of 21,586 turns is being used as a magnetic field sensing unit for pulsations in the range 1- to 50-sec period. A figure indicating the 3914 Å auroral pulsations from 70° of sky coincident with magnetic field micropulsations is included in this brief note. *Subject Headings: 1. Magnetic micropulsations 2. Pulsating aurora 3. Auroral-geomagnetic relationships.—E.Z.S. & A.J.M. ©*

12B-39

550.386:551.510.535

†Campbell, Wallace H. (*Univ. Alaska*), Concerning the nature of short-period magnetic micropulsations. *Journal of Geophysical Research*, Wash., D. C., 65(6):1843-1845, June 1960. 24 refs. **DLC**—A review and interpretation of some of the characteristics of magnetic field micropulsations with periods of 5 to 30 sec. Recent evidence of a close relationship between these micropulsations, pulsating aurora, and ionospheric absorption has indicated that micropulsation amplitudes are a measure of ionospheric electron density. World wide and local effects are discussed with the view that magnetic micropulsations arise within the ionosphere. *Subject Headings: 1. Magnetic micropulsations 2. Geomagnetic-ionospheric relationships.—E.Z.S. ©*

12B-40

551.521.326:016 551.594.5:016

†Chamberlain, J. W. and Meinel, A. B., Emission spectra of twilight, night sky, and aurorae. (In: Kuiper, Gerard P. (ed.), *The earth as a planet*. Chicago, Univ. of Chicago Press, 1954. p. 514-575. table, 18 figs., refs. p. 568-575.) **DWB**. Also issued in reprint form, as Chicago. University. Yerkes Observatory, Contract AF 19(122)-480, Technical Report, 1954. **DWB**—A thorough review of the subject of the twilight night photometry, identification of spectra (forbidden atomic lines, etc.), height, variations in auroral spectra, auroral temperature and theory, height of emission layers and temperature of night airglow, excitation processes, theory, etc. A most complete bibliography (alphabetical by author) of about 300 items on airglow and auroral theory and spectra (without titles) is included. (*Same item as 6B-182 and 8B-97, Met. Abstracts.*) *Subject Headings: 1. Auroral spectra 2. Night airglow bibliographies 3. Auroral physics bibliographies.—M.R.*

12B-41

551.594.51:546:11:535.3

Chamberlain, Joseph W. (*Yerkes Obs.*), The excitation of hydrogen in aurorae. *Astrophysical Journal*, 120(2):360-366, Sept. 1954. 3 figs., refs., 6 eqs. **DLC**—The Balmer emission produced when protons penetrate the atmosphere during an aurora is investigated by the method of statistical equilibrium. The *H α* luminosity versus height is computed for several incident proton energies and is compared with computations for the luminosity distribution in other emissions. It is found that each incident proton should produce a total of about 50 quanta of *H α* , which leads to a rough estimate for the proton flux of about $6 \times 10^7 \text{ cm}^{-2} \text{ sec}^{-2}$ during the arc stage of a moderately strong aurora. The Balmer decrement is computed, and the theoretical *H α* profile for an arc in the magnetic zenith is compared with MEINEL's observed profile. This comparison suggests that the incident protons undergo considerable scattering, which produces a rather large effect on the observed profile and the luminosity distribution. (*Same item as 6E-152, Met. Abstracts.*) *Subject Headings: 1. Auroral excitation mechanisms 2. Auroral hydrogen lines 3. Balmer lines.—Author's abstract.*

12B-42

551.594.5:551.521.61

Chamberlain, Joseph W.; Fan, C. Y. and Meinel, A. B. (*Yerkes Obs.*), A new O₂ band in the infrared auroral spectrum. *Astrophysical Journal*, 120(3):560-562, Nov. 1954. 2 figs., table, 9 refs. **DLC**—A strong, but heretofore undetected, auroral emission has been identified as the 1-1 band of the forbidden atmospheric system of O₂. Only transitions from $v' = 0$ have been previously observed in auroras. The degree of excitation in the rotational and vibrational levels of the upper electronic state is discussed. (*Same item as 6.8-350, Met. Abstracts.*) *Subject Headings: 1. Auroral spectra 2. Infrared auroral emissions.—Authors' abstract.*

12B-43

551.594.5.1:551.121.7

Chamberlain, Joseph W. (*Yerkes Obs.*), On the production of auroral arcs by incident protons. *Astrophysical Journal*, 120(3):566-571, Nov. 1954. 3 figs., 6 refs., 10 eqs. **DLC**—A theory of the production of auroral arcs is extended to take account of a dispersion in directions for the incident protons. Earlier calculations of the *H α* profile (by the author) and of the luminosity distributions (by BATES and GRIFFING), for the case of protons entering from only one direction, were considerably different from the observed curves. In this paper the angular distribution of incident protons is obtained by comparing the computed profile and luminosity-curves with the observational data. Essentially the same angular distribution gives a satisfactory representation of both the profile and the luminosity, which suggests that an angular dispersion may indeed be an important effect. (*Same item as 6.9-336, Met. Abstracts.*) *Subject Headings: 1. Auroral arcs 2. Auroral intensities 3. Solar protons.—Author's abstract.*

12B-44

551.594.5

Chamberlain, Joseph W., *Auroral rays as electric-discharge phenomena*. *Astrophysical Journal*, Chicago, 122 (2): 349-350, Sept. 1955. 3 refs. **DLC**—Nearly constant luminosity of auroral rays over a large height and density range requires a compensatory mechanism which is not fully understood. Excitation could increase with height due to greater incident energy, and the number of collisions decrease with height due to decreasing density. A current density of 6×10^{12} electrons/cm² sec would be necessary for a ray 10^4 cm in diameter. An electron density of 10^6 cm⁻³ would be postulated for the lower part of the ray (in arcs 10^3 electrons/cm³). The current density is uncertain because the diameter of rays is uncertain. The theory advanced by author balances the electron and proton influx and penetration against the conductivity in the layers where the arcs form and leads to the conclusion that the electron may be accelerated downward by the pull of the protons and that when arcs recede the rays are left in position originally occupied by the latter. (*Same item as 7.10-298, Met. Abstracts.*) *Subject Heading: 1. Auroral ray luminosity.—M.R.*

12B-45

551.594.51:551.521.326

†Chamberlain, Joseph W. (*Yerkes Obs., Univ. of Chicago*), *Discharge theory of auroral rays*. (In: **The airglow and the aurorae: a symposium**. London, Pergamon, 1956. p. 206-221. 3 tables, 43 refs., 30 eqs.) **DWB** (M94.5 A298)—A provisional discharge theory of auroral rays is developed from the standpoint of the luminosity resulting from inelastic electron collisions. Energy-distribution curves and drift velocities for electrons in an electric field are derived, account being taken of energy losses through inelastic collisions. It is shown that if the electron density, N_e , decreases slowly with height, a ray could be formed in which the green [OI] luminosity is nearly constant over a large range of atmospheric density and altitude. Furthermore, a reasonable assumption for the absolute value of N_e leads to auroral brightnesses of the correct order of magnitude. The ratio of intensities of the red/green oxygen lines are discussed in terms of collisional deactivation, and an illustrative computation is presented. High-excitation emissions, such as N_2^+ , would not be present in the lower part of the ray, but may become strong at higher altitudes. The need for more definitive measurements of height variations in the spectra of pure rays is emphasized. A discussion of ionization equilibrium in a ray indicates that the discharge will maintain the necessary electron density. It is suggested that fluctuations in the brightness of a ray may arise from frequent dispersing of the ray's ionization by upper-atmospheric winds. The production of an electric field in the atmosphere is discussed. It is suggested that incident protons might provide the necessary acceleration of ionospheric electrons, with the electron current becoming constricted along narrow paths, which appear as rays. (*Same item as 9.7-277, Met. Abstracts.*) *Subject Headings: 1. Auroral theories 2. Electronic excitation of auroras.—Author's abstract.*

12B-46

551.594.51:016

†Chamberlain, Joseph W., *Theories of the aurora*. *Advances in Geophysics*, N. Y., 4:109-215, 1958. 21 figs., 113 refs., numerous eqs. **DLC**. Also reprinted as Chicago. Univ. Yerkes Obs., Williams, Bay, Wisc., Contract AF 19(122)-480, Technical Report, No. 40.—A major critical summary and review of current knowledge of auroral physics and theory. Historical and observational aspects comprise Ch. 1; Motions of charged particles in magnetic fields, Ch. 2; STÖRMER's theory, Ch. 3; Electric currents from sun to earth, 4; CHAPMAN-FERRARO's theory and ring current, 5; ALFVÉN's, HOYLE's and LEBEDINSKIĭ's theories, 6; VESTINE and WULF's dynamo theory, SINGER's shock-wave theory, PARKER's theory of hydromagnetic displacement of lines of force, MARIS-HULBURT's UV-light and meteor theories, 7; and theories of auroral excitation, 8. (*Same item as 9.9-17, Met. Abstracts.*) *Subject Headings: 1. Auroral theories 2. Auroral bibliographies.—M.R.*

12B-47

551.594.5

Chamberlain, Joseph W. (*Yerkes Obs., Univ. of Chicago*), *Origin of the aurora*. *Sky and Telescope*, Chicago, 17(6/7), April/May 1958. Abstracted from reprint of 10 p. photos.—The facts about the auroral zone—its shifts toward the equator during sunspot maxima with a pronounced yearly variation with two maxima (in March and Sept.), and the various heights and forms of the aurora with their different coloring—are described. The relation aurora-sun seems to be not too impressive, but the aurora does seem to be associated with magnetic storms. The information on the nature of incoming particles given by luminosity curves of the spectrum serve as explanation of its solar effects. The present auroral theories are surveyed with the result of evidence that aurorae are produced by charged particles entering the atmosphere from extra-terrestrial space, but also noting the obstacles to developing a quantitative theory, due to insufficient data and the mathematical difficulties. The case against a variety of current auroral theories which are concerned with the propagation of solar ions into the earth's magnetic field is surveyed. A quantitative theory of the origin of these particles is not favorable to any existing theory. On the nature of auroral protons the characteristic red or blue light detected with spectrograph is explained by the following process: after enough encounters with atmospheric molecules the proton will be traveling considerably slowed

down, capable of stealing an electron from one of the oxygen or nitrogen molecules as passing by them. The proton becoming a hydrogen atom emits the characteristic red or blue light. To explain the three types measured about the hydrogen radiation, i.e. the profiles looking along or perpendicular to the earth's magnetic field and the change in intensity of radiation with height, it is supposed that only a few of the particles enter the atmosphere with the same speed. The fast particles would penetrate deep into the atmosphere while the slower ones would radiate only at higher levels. Many theories exist on the role of electrons in the aurora. It seems that arc forms have stronger hydrogen lines than rayed draperies have; there seems to be a direct relation of hydrogen intensity and latitude. Alternative theories on producing aurora by electrons entering from outside the atmosphere, by electric discharge by a steady current of electrons through the ionosphere and by magnetic reflection are surveyed, but these are still highly speculative. The northern lights on March 11, 1958 observed from Ft. Dodge, Iowa and a spectrogram of the aurora of March 2, 1957 photographed at Yerkes Observatory with other photographs and diagrams illustrate the various theories. *Subject Heading: 1. Auroral theories.—O.T.*

12B-48

551.594.5:546.21:535.33:551.593.7

Chamberlain, Joseph W. (*Yerkes Obs., Univ. of Chicago, Williams Bay, Wisc.*), **On the polarization of the oxygen red line in aurorae.** *Planetary and Space Science*, N. Y., 2(1):73-75, Oct. 1959. 3 refs., 3 eqs. **DWB**—R. A. DUNCAN reported in a recent paper a 30 percent polarization of $\lambda 6300$ in a low latitude, red aurora. The interpretation given was that the exciting electron possess a highly preferential motion. The present note casts doubt on his arguments, based on semi-classical theory, that this motion would be perpendicular to the magnetic field rather than along it. It is explained that polarization is a direct consequence of the Zeeman effect and a precise calculation of the polarization requires a knowledge of how the angular momentum of the atom changes direction. It is difficult, therefore, to make any qualitative statements based on the semi-classical theory. *Subject Heading: 1. Red auroral line.—I.S. ③*

12B-49

546.17:551.594.12:551.510.535

†Chamberlain, Joseph W. and Sagan, C. (*both, Yerkes Obs., Williams Bay, Wisc.*), **Origin of nitrogen ionization in the upper atmosphere.** *Planetary and Space Science*, N. Y., 2(2/3):157-164, 1960. 3 figs., 2 tables, 32 refs., 10 eqs. **DWB**—Although the N_2^+ First Negative bands in twilight are probably the result of resonance scattering by N_2^+ ions, the symmetry of morning and evening observations make it unlikely that the ionization is produced by sunlight in the E-region. If the flux in the He II $\lambda 304$ line is as high as $15 \text{ erg cm}^{-2} \text{ sec}^{-1}$, the observed First Negative system intensities can be accounted for, and the nitrogen ionization is localized in the F-region. If the flux in the $\lambda 304$ line is much smaller, the ionization must be produced by incident charged particles in the E-region. *Subject Headings: 1. Nitrogen ionization in upper atmosphere 2. Ionization theories 3. Ionospheric ionization.—Authors' abstract. ⑤*

12B-50

551.594.5:550.388.8

Chamberlain, Joseph W.; Kern, J. and Vestine, E. H., **Some consequences of local acceleration of auroral primaries.** *Journal of Geophysical Research*, Wash., D. C., 65(8):2535, Aug. 1960. 10 refs., 4 eqs. **DLC**—Some consequences of a local acceleration of charged particles trapped in the magnetic field are pointed out. If appreciable acceleration does occur, it may explain not only the energy spectra but also the occurrence of auroras on the dark hemisphere, certain other aspects of auroral morphology, and possibly even the auroral electrojet. *Subject Headings: 1. Auroral primaries 2. Auroral electrojet 3. Trapped radiation.—E.Z.S. ⑤*

12B-51

551.521.326 551.594.51

Chapman, Sydney, **On the production of auroral and night-sky light.** *London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science*, 7th Ser., 23(156):657-665, April 1937. refs. **DLC**—Advances a theory of the production of night sky light. Energy involved is originally derived from sunlight being stored during the day mainly in the form of dissociation of O_2 molecules. Author outlines ways in which the different observed lines and bands of the night sky spectrum could be excited by the recombination of O atoms, the third particle necessarily participating being a nitrogen molecule or another oxygen atom and more probably the former. The auroral spectrum, on the other hand, is attributed to strong excitation by impact due to high speed particles, whether ions or electrons, entering the atmosphere from outside. The presence of lines of atomic N is considered to be very doubtful. (*Same item as 8B-13, Met. Abstracts.*) *Subject Headings: 1. Night airglow theories 2. Auroral theories.—Physical Abstracts, No. 2014, 1937.*

12B-52

551.594.5:550.385

†Chapman, Sydney (*Queens College, Oxford*), **A theory of the aurora polaris.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 30:367-389, July 1954. 4 figs., 44 refs.,

17 eqs. Discussion p. 386-387. **DLC**—The main facts observed concerning the aurora and the closely associated phenomenon of magnetic disturbance or storms are outlined. For several reasons, it is thought that a considerable portion of the theory of magnetic disturbances must be common ground. Discussion proceeds on the basis that the cause of the aurora is the emission from the sun of a neutral but ionized gas, probably consisting mainly of hydrogen. Such an emission appears to occur sometimes in a strong burst which lasts for approximately an hour. The burst is associated with an intense solar flare, followed by a great magnetic storm with an exceptionally active and widespread aurora. The emission may continue (possibly with interruptions) for weeks, producing a series of moderate magnetic storms and auroras, which, unlike the great storms, manifest the 27-day recurrence tendency. Minor magnetic activity, and the auroras observable from places near the auroral zone on almost every clear night, are likely to be caused by emissions of solar gas of relatively low density and/or speed. (*Same item as 6.9-331, Met. Abstracts.*) *Subject Headings: 1. Auroral theories 2. Magnetic storms 3. Auroral emissions.*—*From author's abstract.*

12B-53

550.38:551.594.51

Chapman, Sydney and Sugiura, Masahisa (*both, Geophysical Inst., Univ. of Alaska*), **Arc-lengths along the lines of force of a magnetic dipole.** *Journal of Geophysical Research*, Wash., D. C., 61(3): 485-488, Sept. 1956. fig., 2 tables, eqs. **DLC**—Formulas and tables for the arc-length along the lines of force of a magnetic dipole are given with reference to the earth treated as a sphere. These tables may prove useful in connection with the study of radio whistlers and of the motion of charged particles along the lines of geomagnetic force. (*Same item as 8.4-337, Met. Abstracts.*) *Subject Headings: 1. Dipole fields 2. Auroral particles.*—*Authors' abstract.*

12B-54

551.510.535:621.396.11:551.594.5

Chapman, Sydney and Little, C. Gordon, **The nondeviative absorption of high-frequency radio waves in auroral latitudes.** *Journal of Atmospheric and Terrestrial Physics*, 10(1):20-31, Jan. 1957. 3 tables, 21 refs., 14 eqs. **DWB**—In auroral latitudes the nondeviative absorption of high-frequency radio waves is much more irregular, and often much stronger, than in subauroral latitudes. It is greater and more frequent by day than by night; this is the converse of the daily variation of magnetic activity. The electrons that produce the absorption in subauroral latitudes are mainly caused by solar ultra-violet light; in auroral latitudes, often the major source is bombardment of the atmosphere by solar gas. According to J. A. VAN ALLEN's new interpretation of the soft radiation observed by himself and his colleagues in auroral latitudes, down to 50 km, a small minority of the primary bombarding particles generate X-rays, which penetrate further than the particles themselves. It is here suggested that the layer ionized by these X-rays is an important factor in the daytime radio absorption. Also, as D. R. BATES has pointed out, Lyman-alpha radiation will be generated by the auroral protons; ionization of nitric oxide molecules by this radiation may also contribute appreciably to the absorption. The same processes of ionization will occur likewise at night, and often still more strongly; however, loss of the electrons to form negative ions by attachment is countered by photo-detachment during the day, but not at night. Very tentative tables are given, based on these ideas, indicating ionospheric conditions consistent with greater daytime absorption than at night, even when the nighttime bombardment is twenty times more intense than that by day. The corresponding absorption relaxation times, and daily variation of magnetic disturbance, will be examined in a later note. (*Same item as 8.6-179, Met Abstracts.*) *Subject Headings: 1. Ionospheric absorption 2. Auroral effects on radio propagation.*—*Authors' abstract.*

12B-55

551.594.5:06

*†Conference on Auroral Physics, July 23-26, 1951, London, Ontario, **Proceedings.** Ed. by N. C. Gerson; T. J. Keneshea and R. J. Donaldson, Jr. *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 30, July 1954. 459 p. numerous tables, diagrs. (incl. photos) and eqs. Bibliogs. throughout. Alphabetical author and subject indexes. **DLC**—The papers collected in this volume have been abstracted separately. They cover the theory and physico-chemical aspects of the aurora, sunlit aurora, radar or radio reflections from auroras, the airglow, laboratory investigations of upper atmospheric processes and auroral afterglow, interpretation for atmospheric emission, geomagnetic storms and aurora, solar and magneto-hydrodynamic waves and atmospheric absorption. Many references and a good index are included. (*Same item as 6.9-3, Met. Abstracts.*) *Subject Headings: 1. Auroral physics conferences 2. Upper atmosphere research. I. Gerson, N. C. (ed.) II. Keneshea, T. J. (ed.) III. Donaldson, R. J., Jr., (ed.) IV. U. S. Air Force. Cambridge Research Center V. London, Ontario. Univ. of Western Ontario.*—*M. R.*

12B-56

551.594.5(72)

Hernández Corzo, Gilberto and Adem, Julián, **Auroras observed in Mexico before the International Geophysical Year, 1957/1958.** *Comité Nacional Mexicano, Results of the IGY in Mexico, Report*, No. 1:10-15, Dec. 1958. table, 10 refs. **DWB** (551.06

1613re)—A search of literature shows only 3 auroras observed in central Mexico before IGY: Nov. 14, 1789, Sept. 1, 1859 and Feb. 4, 1872 at Mexico City (19°N), Lion (21°N) and San Luis Potosi (22°N), respectively. No other aurora has been observed in central Mexico from Feb. 1872 until Feb. 11, 1958. The first one (1789) was also observed at Oaxaca (17°04'N). References are cited. *Subject Headings: 1. Auroras in central Mexico 2. Central Mexico—M.R.*

12B-57

550.38:551.594.51

Coulomb, J., *Sur une origine aurorale possible de certaines pulsations géomagnétiques*. [Possible auroral origin of certain magnetic pulsations.] *Annales de Géophysique*, Paris, 13(2):91-102, April/June 1957. 5 refs., numerous eqs. English summary p. 91. **DLC**—There is a *a priori* possibility of some pulsations to be generated during polar auroras and to be propagated from polar zones towards lower latitudes. A theory, rather incomplete mathematically, of the propagation, gives correct orders of magnitude for "giant pulsations." But for the "pulsation trains" often associated with geomagnetic bays, the results are in contradiction to observed phenomena. (Same item as 10.6-80, *Mel Abstracts*.) *Subject Headings: 1. Magnetic pulsations 2. Auroral-magnetic relationships.—Author's abstract.*

12B-58

551.594.51:546.291

Dalgarno, A. and McDowell, M. R. C. (*Queen's Univ., Belfast*), *Simultaneous excitation and ionization of helium by electron and proton impact*. (In: *The airglow and the aurorae: a symposium*. London, Pergamon, 1956. p. 340-345. 3 tables, 10 refs., 30 eqs.) **DWB**—Using Born's approximation, cross-sections have been calculated for the processes $e + \text{He} \rightarrow e + \text{He}^+(nl) + e$ and $\text{H}^+ + \text{He} \rightarrow \text{H}^+ + \text{He}^+(nl) + e$ for nl , any of $2p, 3p, 4p, 3d$, and $4d$. (Same item as 8.7-338, *Mel. Abstracts*.) *Subject Headings: 1. Auroral physics 2. Helium.—Authors' abstract.*

12B-59

551.510.535

Dieminger, Walter, E. (*Max-Planck Inst. for Aeronomy*), *Clouds in the sporadic E-layer*. *Annales de Géophysique*, Paris, 15(1):23-30, Jan./March 1959. 8 figs., 24 refs. French summary p. 23. **DLC**—The sporadic E layer with its drifting clouds is still an unsolved problem of the ionosphere. Several questions are discussed here. To explain the fact of transparency, the hypothesis fitting best the bulk of observations is that of a nebulous structure of the Es layer. Horizontal extension, development and drifting away of these banks of clouds are studied. Finally, the possible origins of auroral E and sporadic E in moderate and equatorial latitudes are discussed. Auroral E seems to be produced by solar corpuscles penetrating as low as 100 km, or by radiation (probably X-rays) produced by the solar particles at greater heights. The release of energy stored during daytime by dissociation or ionization seems to be the most probable origin of sporadic E. (Same item as 10.10-205, *Mel. Abstracts*.) *Subject Headings: 1. E layer transparency 2. Drifting ion cloud banks 3. Auroral E layer origin 4. Sporadic E layer (Es) in nonpolar regions.—A.V.*

12B-60

551.594.5

Djakow, A., *L'aurora boréale extraordinaire observée dans les montagnes Choré (Sibérie, U.R.S.S.) le 11 février 1958*. [The extra-ordinary aurora observed in the Choré Mountains (Siberia, U.S.S.R.) on Feb. 11, 1958.] *L'Astronomie*, Paris, 72(4):174-175, April 1958. 2 figs. **DLC**—Description of an intense boreal aurora observed during the evening on Feb. 11, 1958. This phenomenon, exceptionally intensive for mean latitudes, was caused by the presence of a group of sunspots of a surface of about 2500 millionth, crossing the central meridian between Feb. 8 and 10, 1958. Very intensive corpuscular currents from eruptions associated with the group of sunspots reached the earth on Feb. 11, and caused this beautiful aurora observed in Siberia. *Subject Headings: 1. Auroral observations 2. Choré Mts, Siberia.—A.V.*

12B-61

551.521.326 551.594.5

Elvey, C. T. *Progress in studies of the airglow in upper air research*. *American Journal of Physics*, Lancaster, Pa., 18(7):431-437, Oct. 1950. 5 figs., foot-refs. **DLC**—Report of program supported by the Office of Naval Research at the U. S. Naval Ordnance Test Station at China Lake, Calif. Paper opens with a review of the nature of the light of the night sky. Sources of light of the night sky with continuous spectrum are: unresolved stars, galactic light, zodiacal light and light from all astronomical sources scattered by the atmosphere. The sources of light with line spectra are: diffuse nebulae of the galaxy, aurora and light of the night sky. The term "air glow" has been adopted by the author to designate light, other than polar aurora, emitted by the upper atmosphere. An explanation of the cause of airglow is given and the principal radiations in the air glow are listed. Gives location of observing sites and describes spectrograph and recording photometer. The spectroscopic and photometric programs are reviewed. "Spectroscopic observations of faint high altitude auroral rays and diffuse aurorae show some very interesting results which have not been completely analyzed. The $\text{H}\alpha$ line has been identified as a faint component of the airglow spectrum; it may,

however, be a result of distant high altitude aurorae. The photometric observations show that the green auroral line of oxygen has an intensity of 5×10^8 quanta/cm² sec and is emitted in a region near the E layer of the ionosphere at maximum in winter; that the sodium D lines correspond to 8×10^7 quanta/cm² sec, show a large annual variation, and are emitted from the general vicinity of the night F layer. Furthermore, resonance excitation of sodium atoms at twilight can be detected to heights of 800 km in the atmosphere." (*Same item as 8B 46, Met. Abstracts.*) *Subject Headings:* 1. Night airglow spectrum 2. Auroral spectra 3. Green auroral line.—*From author's abstract.*

12B-62

551.594.51

Fan, C. Y. and Shulte, D. H. (*both, Yerkes Obs., Williams Bay, Wisc.*), Variation in the auroral spectrum. *Astrophysical Journal*, 120(3):563-565, Nov. 1954. 3 figs., 4 refs. **DLC**—A patrol study of auroral emissions was made with a fast grating spectrograph at the Yerkes Observatory. It was found that (1) all quiet arcs showed a very intense H α line, whereas rayed features never showed H α ; (2) the Meinel system of N₂⁺ underwent little variation relative to the First Positive system of N₂. The implications of these findings are discussed. (*Same item as 6.10-284, Met. Abstracts.*) *Subject Headings:* 1. Auroral spectrum variations 2. Auroral spectra.—*Authors' abstract.*

12B-63

551.544.51:535.33

Fan, C. Y. (*Yerkes Obs.*), Is helium a component of auroral particles? *Astrophysical Journal*, Chicago, 122(2):350-351, Sept. 1955. fig., 3 refs. **DLC**—Failure to observe Doppler-shifted He lines in early laboratory experiments by FAN and MEINEL (1953 and 1954), using high energy protons (He⁺ and Ne⁺ ions) in air at 10⁻¹ mm pressure, is attributed to such high pressures used to avoid long exposure time. At 10⁻¹ mm Hg it was found the lifetime of the first bound electron of an He atom was only 10⁻⁹ sec and hence the He atom would have lost its electron before the optical transition could occur. By reducing the pressure to 10⁻³ and 10⁻⁴ the Doppler-shifted He lines at 5876 and 6678 Å were clearly visible (as a double line at 10⁻⁴ mm but not so clear at 10⁻³ mm). In the actual aurora no such lines have been detected, but interference from the strong 6705 Å band of the first N₂⁺ system would account for failure. The λ 5876 should be detectable if auroral particles are composed of 5% or more He particles. High dispersion spectra of quiet arcs are needed to decide whether the lines are really there or have merely been masked by other lines. (*Same item as 8.1-387, Met. Abstracts.*) *Subject Headings:* 1. Auroral spectra 2. Helium in auroral particles 3. Doppler displacement of He lines.—*M.R.*

12B-64

551.594.51

Fan, C. Y. (*Yerkes Obs.*), Laboratory studies of auroral excitation. (In: *The airglow and the aurorae: a symposium*. London, Pergamon, 1956. p. 276-282. 4 figs. (incl. photos), 7 refs.) **DWB**—This paper summarizes results of laboratory experiments on the interactions of air with electrons (10-8000 eV), protons (5-350 keV), and He⁺ ion (10-450 keV). With low-energy protons and He⁺ ions as exciting particles, hydrogen and helium emissions, produced by the process of charge exchange, can always be detected. The charge exchange process plays such an important role that the relative intensities of the negative and the Meinel systems of N₂⁺ in an ionic impact spectrum are significantly different from those excited by electrons. Various questions related to auroral excitation are also discussed. (*Same item as 8.7-339, Met. Abstracts.*) *Subject Heading:* 1. Auroral energy excitation mechanism.—*Author's abstract.*

12B-65

551.594.51:546.11:550.385

†Fan, C. Y., Time variation of the intensity of auroral hydrogen emission and the magnetic disturbance. *Astrophysical Journal*, Chic., 128(2):420-427, Sept. 1958. 3 figs., table, 21 refs., 5 eqs. **DLC**—The time variation in the intensity of auroral hydrogen emission and the magnetic disturbance were simultaneously recorded for a number of cases at the Yerkes Observatory. It was found that the horizontal component of the terrestrial magnetic field increases prior to the appearance of an auroral arc and that the onset of a negative bay in the disturbance coincides with the breakup of the arc to rays and an abrupt decrease in the intensity of the hydrogen emission. These observations suggest that there are two current systems—one responsible for the acceleration of auroral protons and electrons for the excitation of auroral arcs, and the other for the acceleration of auroral electrons for the excitation of auroral displays of more active types. (*Same item as 10.6-325, Met. Abstracts.*) *Subject Headings:* 1. Auroral hydrogen lines 2. Auroral-geomagnetic relationships.—*Author's abstract.*

12B-66

551.594.51:550.385.4

Ferraro, V. C. A. (*Queen Mary College, Univ. of London*), Origin of magnetic storms and aurorae. *Annales de G ophysique*, Paris, 11(3):284-304, July/Sept. 1955. 11 figs., table, 19 refs., 12 eqs. **DLC**

—This paper gives a full, well-illustrated account of the Chapman-Ferraro theory of magnetic storms and aurorae. After reviewing briefly the reasons in favor of a solar corpuscular theory, and the average characteristics of magnetic storms derived from the analyses of CHAPMAN and MOOS, the nature of such streams is discussed at some length, with special reference to its composition, geometry, and dimensions. The solar stream seems likely to consist mainly of protons and electrons and to advance in to the earth's field with a speed of the order of 10^8 cm/sec. It is shown that during this advance, surface currents are induced in the stream surface and that these shield the back of the stream from the geomagnetic field. MARTYN's extension of the theory to polar disturbances and auroras is briefly reviewed. The chief feature of this is the recognition that a high potential difference exists across the ring enabling escaping charges from the unstable surface layers to be accelerated to speeds well above the streaming velocity of 10^8 cm/sec. and be precipitated along the auroral zones. This accords well with the fact discovered by MEINEL that the speed of protons entering the atmosphere during auroral displays may well be about 10^9 cm/sec. ALFVÉN's theory is also briefly discussed. (*Same item as 8.3-338, Met. Abstracts.*) **Subject Headings:** 1. Magnetic storms 2. Chapman-Ferraro theory 3. Auroral theories.—*From author's abstract.*

12B-67

551.594.5:550.385.4

Ferraro, V. C. A. (*Queen Mary College, Univ. of London*), **Aurorae and magnetic storms.** (In: Bates, D. R. (ed.), **The earth and its atmosphere.** N. Y., Basic Books, 1957. p. 231-255. 13 figs.) **DLC**—The history of discovery of the relation between magnetic storms and the aurora, variations of the geomagnetic field, storm time variations, daily variations, form and color of aurorae height, the sunlit aurora, geographic distribution, diurnal variation, auroral spectrum, solar relations, 27-day recurrence, neutral ionized streams, theories of geomagnetic storms and auroras (BIRKELAND-STÖRMER, CHAPMAN-FERRARO, MARTYN, ALFVÉN, BENNET and HULBURT, and the atmospheric theory of OLIVER WULF, VESTINE and others) are treated in popular style with schematic diagrams and photos. (*Same item as 9K-30, Met. Abstracts.*) **Subject Headings:** 1. Auroras 2. Magnetic storms 3. Auroral-magnetic relationships.—*M.R.*

12B-68

551.594.51:550.38

Fleischman, O. and Lippmann, B. A., **Remarks on Alfvén's perturbation method.** N. Y. Univ. Inst. of Mathematical Sciences, Div. of Electromagnetic Research, Contract AF 19(604)-926, Research Report MH-4, August 1955. 11 p. ref., num. eqs.—ALFVÉN's perturbation method for treating the motion of a point charge in a magnetic field consists of three elements: 1) The field is regarded, in zero order, as homogeneous. In the next order, the zero-order motion is replaced by its averaged effect, a magnetic dipole, and the interaction of this "equivalent dipole" with the inhomogeneities of the field constitutes the perturbation. 2) The moment of the "equivalent dipole" is constant. 3) If the field is axially symmetric, the "equivalent dipole" moves on the surface generated by rotating a line of force about the polar axis. ALFVÉN develops his method by the analysis of several special cases. In this report, we have re-derived his perturbation scheme from a viewpoint that emphasizes general dynamical principles. Thus: 1) is derived directly from HAMILTON's principle, 2) is proved by the adiabatic theorem, after noting that the moment of the "equivalent dipole" is an action variable, while 3) is related to the conservation of angular momentum. Our remarks under 2) and 3) are intended as an extension of ALFVÉN's discussion. (*Same item as 8.3-339, Met. Abstracts.*) **Subject Headings:** 1. Auroral particles 2. Magnetic effects.—*Authors' abstract.*

12B-69

551.594.51:535.33:539.13

†Fraser, P. A.; Jarman, W. R. and Nicholls, R. W., **Transition probabilities of molecular band systems, Pt. 5. Collected results: N₂, N₂, NO, O₂.** London, Ontario. University of Western Ontario. Dept. of Physics, Contract AF 19(122)-470, Scientific Report, No. 8, Feb. 16, 1953. Also their Pt. 6, **Collected Results: N₂, N₂, CN, C₂, O₂, TiO.** *Ibid.*, Scientific Report, No. 10, July 1, 1953. tables, refs., eqs. **DWB**—In this report arrays of p-values computed for the following transitions are given:

N ₂	$A^3\Sigma_u^+ \rightarrow x^1\Sigma_g^+$	(Vegard-Kaplan, Extended table)
N ₂	$A^2\Pi_u \rightarrow x^2\Sigma_g^+$	(Meinel)
CN	$A^2\Pi \rightarrow x^2\Sigma^+$	(Red)
	$B^2\Sigma^+ \rightarrow x^2\Sigma^+$	(Violet)
C ₂	$A^3\Pi_g \rightarrow x^3\Pi_u$	(Swan)
O ₂	$b^1\Sigma_g^+ \rightarrow x^3\Sigma_g^-$	(Atmospheric Oxygen)
	$B^3\Sigma_u^- \rightarrow x^3\Sigma_g^-$	
TiO	$A^3\Delta \rightarrow x^3\Pi$	(γ)

The computational methods employed in obtaining these values are described in other reports. **Subject Headings:** 1. Molecular structure 2. Spectrographs.—*Authors' abstract.*

12B-70

551.594.51:535.33:546.17

†Fraser, P. A., **Transition probabilities of molecular band systems, Pt. 12, Approximate calculations of the electronic transition moment.** London, Ontario. Univ. of Western Ontario. Dept. of Physics, Contract AF 19(122)-470, Scientific Report, No. 17, July 15, 1954. 22 p. 3 figs., 3 tables, 24 refs., 37 eqs. **DWB**—Calculations of the electronic transition moment for the First and Second Positive band systems of nitrogen are described. The work is based on the LCAO approximation to the molecular orbitals. The transition giving rise to the First Positive system is of the perpendicular type and the transition moment is found to vary considerably with internuclear distance. There is less variation found for the transition moment associated with the Second Positive system, as is expected for a parallel type transition. The effect of hybridization of the orbitals is tested on the Second Positive transition moment, and not much effect is found on the variation with internuclear distance. However, the magnitude is changed considerably. The results apply qualitatively, in this approximation, to transition in other homonuclear molecules which involve the same orbital changes, and could be expected to apply also the 'almost homonuclear' molecules. *Subject Headings:* 1. Spectral systems 2. Nitrogen.—*Author's abstract.*

12B-71

551.594.52:550.385.4:551.510.535

Fukushima, Naoshi (*Geophys. Inst., Tokyo Univ.*), **Constitution of polar magnetic storms, Pt. 2. Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere Research in Japan, 6(4):185-193, Dec. 1952.** 10 figs., 7 refs., 6 eqs. **DWB**—Geomagnetic variations appearing in world-wide magnetic data for May 1 and 2, 1933 are analyzed. The form of these variations conveys corroboration of the author's theory that the disturbance field of polar magnetic storms can be identified as a series of intermittent or successive elementary disturbances originating along the auroral zone as a result of the occasional concentration of extraterrestrial corpuscular invasion. For Pt. 1 by T. Nagata and N. Fukushima, see *Ibid.*, 6(1):85-98, 1952. (Same item as 9K-35, *Met. Abstracts.*) *Subject Headings:* 1. Magnetic storms 2. Auroral zones.—*G.T.*

12B-72

551.594.51:535.33:546.11

†Gal'perin, Iu I. (*Acad. of Sciences U.S.S.R., Moscow*), **Hydrogen emission and two types of auroral spectra.** *Planetary and Space Science*, N. Y., London, 1(1):57-62, Jan. 1959. 4 figs., 22 refs. **DLC**—Various characteristics of auroral activity have been correlated with the hydrogen emission. This emission has been studied with the CII-48 and CII-47 spectrographs having dispersions of 85-95 and 200 Å/mm, respectively. The observations were made at the Loparskaya station of this Institute where the geomagnetic latitude is 64°. The correlations include the intensity of H_α with: (1) K-index, (2) atomic lines of OI, OII, NI and NII, (3) molecular bands 1 NG and 2NG of N_2^+ and 1 NG of O_2^+ , (4) intensities of H_γ and H_δ as well as their profiles and (5) radio reflections. (See Pt. 3, p. 1597, Oct. 1959, *MAB* for additional information.) (Same item as 10.10-304, *Met. Abstracts.*) *Subject Headings:* 1. Auroral hydrogen lines 2. Auroral spectra.—*Author's abstract.*

12B-73

551.594.51

Garstand, R. H. (*Univ. of London Observatory*), **Transition probabilities of auroral lines.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, 1956. p. 324-327. 2 tables, 11 refs., eqs.) **DWB**—T.P. values are tabulated for the $2p^3$ configuration of the forbidden lines of OII and NI, and also for the auroral line, 5577 Å. It is pointed out that the most probable value for the latter is about 25% smaller than that based on an s_p value derived from a self-consistent field with exchange, viz. $1.0 \text{ sec}^{-1} \pm 0.2$. For the ions, OII and NI, transition probabilities for the $^2P-^4S$, $^2P-^2D$ and $^2D-^4S$ lines may be in error by $\pm 20\%$, $\pm 40\%$ and $\pm 50\%$, respectively. (Same item as 8.7-336, *Met. Abstracts.*) *Subject Headings:* 1. Auroral spectra 2. Forbidden N lines.—*Physics Abstracts*, No. 9144, 1956.

12B-74

551.594.51:546.11

Gartlein, C. W. and Sprague, (*both, Physics Dept., Cornell Univ.*), **Hydrogen in aurora.** *Journal of Geophysical Research*, Wash., D. C., 62(4):521-526, Dec. 1957. fig., 16 refs. **DLC**—Auroral spectrograms taken at Ithaca, N. Y., and Arnprior, Ontario, showing hydrogen lines have been studied. The velocity of incoming protons, as deduced from the Doppler shift, has been used to calculate the penetration of the protons into the atmosphere. The penetration appears possible to the 115-km level. The intensity of hydrogen alpha has been obtained (1) by comparison with the known intensity of oxygen radiation 5577 of the normal night sky, (2) by calculation from characteristics of the photographic emulsion, and (3) by calculation from the total intensity of auroral light. These methods agree within an order of magnitude. The H-alpha flux is about 10^{-4} erg per cm^2 column per steradian per sec. (Same item as 9.7-278, *Met. Abstracts.*) *Subject Heading:* 1. Auroral hydrogen lines.—*Authors' abstract.*

12B-75

551.501.7:551.594.5

Gartlein, C. W., **Visual observation of the aurora.** *American Geophysical Union, Geophysical Monographs*, No. 2:92-96, 1958. 4 figs., 5 refs. **DLC.** Same title issued in: *Annales de Géophysique*, Paris, 15(1):31-38, 1959. 5 figs., 2 refs. **DLC**—The history of visual observations of the aurora is summarized briefly and various reporting methods, especially that of KIMBALL and GARTLEIN, are described. The system of mark-sense reporting introduced as a trial run for the IGY in 1955, the U. S.-Canadian reporting method used in the IGY, the Canadian-United States IGY aurora programs including North America, Alaska and Antarctica are described. On the basis of studies on the behavior of electron beams in a laboratory vacuum tube the author concludes that the aurora, from the time of arc formations until well after the time of ray formation, is the expected effect of a sheet of protons moving along a magnetic field. This theory requires that the curves in the Southern Hemisphere be reversed; there a spiral would appear twisted in the anticlockwise direction. This theory also may enable us to detect the cases where electrons play an important role, as possibly in flames or pulsating aurora. Furthermore, this theory suggests that broadening of the hydrogen lines, the spreading velocity, and the size of the formations may indicate the distance to the focusing region. **Subject Headings:** 1. Visual observation of auroras 2. Auroral observation program.—I.L.D.

12B-76

551.521.3 551.593 551.594.5

Gavrilov, V., **Svetovye iavleniia v atmosfere.** [Luminous phenomena in the atmosphere.] Moscow, Gos. Izd-vo Kul'turno-Prosvetitel'noi, 1952. 36 figs., plates (color). **DLC (QC975.G3)**—Description and scientific interpretation of many atmospheric phenomena are given in popular form with illustrations. The description includes some phenomena known since ancient times such as the rainbow, mirage, solar ring, light cross, aurora, twilight, afterglow, etc., and also some recently discovered phenomena such as luminous atmosphere and clouds, Aurora borealis, etc. The luminous phenomena in the upper atmosphere are related partly to the interaction of the sun's rays with water drops, ice crystals, fine particles of dust and gas molecules and partly to the interaction of the solar energy with the gas molecules in the ionosphere. **Subject Headings:** 1. Upper atmosphere radiation 2. Optical phenomena 3. Auroras.—N.P.S.

12B-77

551.510:551.594.5

†Gerson, Nathaniel C., **The terrestrial atmosphere.** *Science Progress*, London, 40(158):245-254, April 1952. fig., 7 tables. **DWB**—The atmosphere is divided into troposphere, stratosphere, chemosphere, ionosphere, mesosphere and exosphere by surfaces (in lat. 45°) at 11, 32, 80 and 400 km. Text and tables summarize composition and photochemistry, temperature, pressure, density and free path at different levels, height and electron density of ionic layers D-G. Brief accounts are given of aurora, night and twilight airglow, and dynamics of ionosphere and mesosphere. (Same item as 3.7-77 and 6E-108, *Met. Abstracts*.) **Subject Headings:** 1. Night airglow 2. Atmospheric structure 3. Auroras 4. Ionosphere.—C.E.P.B.

12B-78

551.594.5:621.396.1

Gerson, Nathaniel C. (U. S. A. F. Cambridge Res. Ctr., Geoph. Res. Directorate), **A note on auroral interaction.** *Journal of Atmospheric and Terrestrial Physics*, London, 4(1/2):81-82, 1953. **DWB**—Several explanations are possible for the modulation of radio frequencies when reflected from auroral curtains. The probability is that the phenomenon is caused by a Doppler effect. However, this effect would be 5 to 50 times as great as is actually observed, assuming ionospheric winds of 250 km/hr. More probable results could be produced by assuming that the reflections come from the sides, not the ends of the approaching stream of solar protons. A few quantitative values for these models are given in tables. (Same item as 7.9-266, *Met. Abstracts*.) **Subject Headings:** 1. Auroral effects on radio propagation 2. Radio wave reflection from auroras 3. Doppler effect.—M.R.

12B-79

551.594.51

Gerson, Nathaniel C. (ed.), **Introduction [to the Proceedings of the Conference on Auroral Physics].** U. S. Air Force. Cambridge Research Center, *Geophysical Research Papers*, No. 30:1-39, July 1954. 35 figs. **DLC**—This introduction is a compilation of reference material intended to make the **Proceedings** of the Conference on Auroral Physics self-contained. Relatively brief descriptions of some aspects of the high atmosphere are given but extensive discussions are avoided. Information on pertinent atomic and molecular properties is included. It is hoped that this data will be helpful in coordinating and integrating the various papers presented at the Conference. (Same item as 6.10-285, *Met Abstracts*.) **Subject Heading:** 1. Auroral physics conferences.—Author's abstract.

12B-80

551.506.22:550.388.8:551.594.5(45)

Giorgi, Maurizio, **Geomagnetismo ed aurore polari.** [Geomagnetism and polar auroras.] Rome, July 1958. 18 p. At head of title page: Consiglio Nazionale delle Ricerche. Comm. Naz.

Ital. An. Geofis. Intern. 1957-58.—A brief explanation and description of earth magnetism and the variations in the earth's magnetic field is followed by a description of the IGY program and Italy's participation in it. A brief note on the nature and observation of aurora is added. *Subject Headings:* 1. Auroral-geomagnetic relationships 2. Italian participation in IGY 3. IGY geomagnetic program 4. IGY auroral program. I. IGY, 1957-1958. Commissione Nazionale Italiana.—E.Z.S.

12B-81

551.594.53

Glasgal, R., *Morphology of aurorae*. (In: Chicago Univ. Yerkes Observatory, Williams Bay, Wisc., Contract AF 19(122)-480, Technical Report, No. 22, *Symposium on auroral observations during the IGY, Sept. 17-26, 1956*, pub. 1956. p. 12-15. 8 refs.) DWB—A list of symbols for auroral forms, their relative frequency, geographical orientation, altitude, periodicity, intensity and color, are outlined or discussed as a short form of auroral atlas. *Subject Heading:* 1. Auroral morphology.—M.R.

12B-82

551.594.51 :535.33

Gribbon, P. W. F. and Stewart, D. T. (*Queen's Univ., Belfast*), *The laboratory excitation of auroral infra-red OI lines*. (In: *The airglow and the aurorae: a symposium*. London, Pergamon, 1956. p. 287-288. fig. (photo), 5 refs.) DWB—The auroral infrared [OI] lines $\lambda\lambda 7774$ and 8446 have been produced, using controlled electron beams at low pressures. The observed intensity ratio is in agreement with the auroral ratio. It is suggested that these lines originate by simultaneous excitation and dissociation of O_2 molecules following single-electron impact. (Same item as 8.7 340, *Mel. Abstracts*.) *Subject Heading:* 1. Auroral spectra.—Authors' abstract.

12B-83

551.594.51/2

Griffing, G. W. and Stewart, A. L. (*Queen's Univ., Belfast*), *The effect of the horizontal extent of aurorae on the apparent luminosity-altitude curves*. *Journal of Atmospheric and Terrestrial Physics*, London, 4(6):339-341, 1954. fig., 8 refs., 3 eqs. DWB—A suspected effect (MEINEL, 1952) of the finite horizontal spread of auroras along the geomagnetic meridian in concealing the time intensity-altitude distribution is investigated theoretically; and a comparison is made between computed and observed (HARANG, 1944) data for the variation of luminosity with height, observed intensities agree with those predicted on theoretical grounds except when the ratio, horizontal/vertical extent of the aurora is much >1 , which is unlikely. Thus the finite horizontal spread of the aurora cannot explain the existing discrepancy between observed and predicted intensities, if the latter is based on the assumption of excitation by mono-energetic protons. (Same item as 7.11-307, *Mel. Abstracts*.) *Subject Heading:* Auroral luminosity-altitude curves.—Physics Abstracts, No. 6187, 1954.

12B-84

551.594.52 551.521.326

Harrison, A. W. and Jones, A. Vallance (*both, Univ. of Saskatchewan*), *Measurements of the absolute intensity of the aurora and night airglow in the 0.9-2.0 μ region*. *Journal of Atmospheric and Terrestrial Physics*, London, 11(3/4):192-199, 1957. 6 figs., 2 tables, 20 refs., 2 eqs. DLC—Absolute intensity measurements have been made at Saskatoon of the bands of $\Delta v=2$ and $\Delta v=3$ sequences of the OH vibration-rotation bands of the night airglow. The relative intensities are in reasonable agreement with the calculations of HEAPS and HERZBERG (1952). The rate of production of OH molecules excited to the ninth vibrational level was estimated from the intensity of the $4,2$ band to 15×10^{11} molecules/cm² column sec. Spectra of the aurora in the 0.9μ - 2.0μ region have been obtained with a spectrometer employing a PbS cell detector. The spectra show several new bands of the Meinel N_2^+ -system and a strong emission at 1.04μ to which both the 0,0 1PG N_2 band and the $2P-2D$ NI doublet probably contribute. Absolute intensity measurements of the infrared auroral bands are in reasonable agreement with estimates based on extrapolations from bands at shorter wave lengths. (Same item as 9.9-315, Sept. 1958, *Mel. Abstracts*.) *Subject Headings:* 1. Auroral intensity measurements 2. Night airglow intensity measurements 3. Saskatoon, Saskatchewan.—Authors' abstract.

12B-85

551.594.51 :535.33

Harrison, A. W. (*Canadian Armament Res. & Dev. Estab., Canada*) and Jones, A. Vallance (*Physics Dept., Univ. of Saskatchewan*), *Observations of Meinel N_2^+ bands near 1.5μ in the auroral spectrum*. *Journal of Atmospheric and Terrestrial Physics*, London, 13(3/4):291-294, Feb. 1959. 2 figs., table, 10 refs. DLC—The 0.1 and 1.2 Meinel bands have been observed in the auroral spectrum at 1.46μ and 1.53μ . The maximum observed absolute brightnesses of these bands were found to be 148 and 426 kilorayleighs (kR), respectively. The brightness of the 1.2 band appears to be anomalously high and this may be a result of preferential excitation by collision with $O^+(^2D)$ ions. A feature of high but fluctuating brightness at 1.59μ agrees in wave length with the $2.3 N_2^+$ band but appears to be somewhat brighter than is consistent with this identification. It is possible that the latter emission may arise from the excitation in aurora of the $0.1 \frac{1}{2}\Delta_0 - ^3\Sigma_0 - O_2$ band. An unidentified

emission has been observed at 1.61μ on some of the auroral spectra obtained. (Same item as 10.10-305, *Met. Abstracts*.) *Subject Headings*: 1. Auroral emissions 2. Auroral spectral intensity.—*Authors' abstract*.

12B-86

551.594.5:550.388.8

Heppner, James P., *Time sequences and spatial relations in auroral activity during magnetic bays at College, Alaska*. *Journal of Geophysical Research*, 59(3):329-338, Sept. 1954. 4 figs., 11 refs. **DLC**—The auroral activity versus geomagnetic latitude and time at Fairbanks is shown during three simple magnetic disturbances of negative bay type, giving also the disturbance vectors. A close relation was found which suggests that "the auroral forms are not independent of the electromagnetic force responsible for the intense auroral-zone currents," as it is usually assumed (CHAPMAN and others). (Same item as 6.7-341, *Met. Abstracts*.) *Subject Headings*: 1. Auroral observations 2. Auroral-geomagnetic relationships 3. Fairbanks, Alaska.—A.A.

12B-87

551.594.5:550.385.43

Heppner, James P. (Calif. Inst. of Technology, Pasadena), *Note on the occurrence of world-wide S.S.C.'s during the onset of negative bays at College, Alaska*. *Journal of Geophysical Research*, Wash., D. C., 60(1):29-32, March 1955. fig., 2 refs. **DWB**—World-wide sudden commencements which appear during the night hours at College, Alaska, are found to occur most frequently during the onset, or decreasing *H* stage, of negative bays. As this stage of magnetic disturbance accompanies a distinct change from homogeneous to rayed aurora, it is suggested that s.s.c.'s have an atmospheric source which is related to sudden changes in auroral activity. (Same item as 7.8-269, *Met. Abstracts*.) *Subject Headings*: 1. Sudden commencements 2. Magnetic disturbances 3. Auroral-magnetic relationships 4. College, Alaska.—*Author's abstract*.

12B-88

551.594.5:771

Herman, Louis and Leinbach, Harold, *Photographic study of the green and infra-red emissions of the polar aurora*. *Alaskan Science Conference, 2nd, Mt. McKinley National Park, Sept. 4-8, 1951, Proceedings*, p. 287, pub. [1953?]. **DWB**—Fast infrared film was used with a red filter in one camera and super X film with a green filter in another camera, to take simultaneous pairs of pictures of the aurora at 2 min intervals with one minute exposure. Over 200 pairs were taken, some of which showed enhancements of infrared emission over the green, the greatest enhancement being by a factor of 4. It is thought that the first positive system of nitrogen was responsible for the infrared enhancement for low altitude auroras. (Same item as 8.3-336, *Met. Abstracts*.) *Subject Headings*: 1. Auroral photography 2. Infrared auroral emissions.—M.R.

12B-89

551.594.51:535.33

†Herman, Louis and Herman, R. (Univ. of Paris), *Laboratory studies of auroral afterglow*. *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 30:221-241, July 1954. 10 figs., 2 tables, 36 refs., 13 eqs. **DLC**—Clarification of several features of the polar aurora is attempted. A new band system is identified in the spectrum of nitrogen. The effect of collisions upon the apparent lifetime of the 5577 Å (OI) line is described. An examination is made of the role of water vapor in the formation of OH, and the emissions of OH from the night airglow are briefly described. Spectra of the aurora obtained in College, Alaska, were compared with spectra obtained in the laboratory. The laboratory spectra of emission from a discharge tube containing pure nitrogen revealed new bands in the near infrared. Although some of these new bands are also present in the spectrum of the aurora, the rotational temperature and the perturbations found in the laboratory are different from those in the aurora; this comes from an overlapping of two different band systems. The possible origin of the new infrared bands is described. A tentative classification is made in a single vibrational scheme. Results indicate that the emission of 5577 Å (OI) from atomic oxygen arises, not from electron impact, but from indirect collision processes. (Same item as 6.10-286, *Met. Abstracts*.) *Subject Headings*: 1. Auroral afterglows 2. Auroral nitrogen bands 3. Experimental auroral spectra 4. Auroral spectra.—*From authors' abstract*.

12B-90

551.594.51:535.33:546.17

Herman, Louis and Morel, J. (both, *Laboratoire des Recherches Physiques, Sorbonne*) and Herman, R. (Obs. de Paris-Meudon), *Émission du spectre de l'azote dans les aurores de haute latitude*. [Emission of nitrogen spectrum in high latitude auroras.] *Annales de Géophysique*, Paris, 12(3): 228-231, 1956. 2 figs., 2 tables, 8 refs., eqs. **DLC**—From a number of previous observations on the emitted spectrum in high latitude auroras, and the experimental results in the laboratories, a definite relationship has been established. Different bands of the emitted electrons and protons from auroras have been studied as to their chemical dissolution as they traverse the atmosphere. A mathematical approach is presented in the report. (Same item as 10.10-306, *Met. Abstracts*.) *Subject Heading*: 1. Auroral nitrogen bands.—N.N.

12B-91

551.521.326:551.594.51:551.590.29

Hoyle, Fred, **Extra-terrestrial influences**. (In: International Conference on the Emission Spectra of the Night Sky and Aurorae, London, 1947, **Papers**. pub. 1948. p. 138-139. 2 eqs.) **DWB**—Evidence from light of the night sky and auroral observations indicates that particles entering the earth's atmosphere from the sun and interstellar space consist of (1) interstellar hydrogen flowing toward the sun at a rate of 40 km/sec and with a density of 500 atoms/cm³; (2) emissions from sun by solar flares and M regions, directed along beams of small solid angle with a speed of 1.5×10^8 cm/sec and density between 1 and 10 atoms/cm³. Interstellar material could acquire energies of order of 3000 ev, and solar material 1000,000 ev, or enough to penetrate to about 90 km height above earth's surface. (Same item as 8B-31, *Met. Abstracts*.) *Subject Headings*: 1. Auroral particles 2. Extra-terrestrial influences 3. Solar flares 4. Night airglow 5. Interstellar space radiations.—*M.R.*

12B-92

551.594.51:535.33

Hunten, D. M. and Shepherd, G. G., **Vibrational temperatures from second positive bands**. *Journal of Atmospheric and Terrestrial Physics*, 6(1):64-66, Jan. 1955. 2 tables, 7 refs. **DWB**—The measurement of relative intensities and the derivation from them of vibrational temperature in the second positive band system of N₂ are discussed. It is concluded that measurements may be confined to the $\Delta v=2$ sequence in the near-ultraviolet. A rather large number of measurements made with a photoelectric spectrometer are shown to lead to a vibrational temperature between zero and 1000°K; it is inherently impossible to distinguish any temperature in this range. The vibrational temperature therefore does not disagree with the kinetic temperature. Measurements by some other workers are briefly discussed. (Same item as 6.8-351, *Met. Abstracts*.) *Subject Heading*: 1. Auroral spectra.—*Authors' abstract*.

12B-93

551.594.51:535.33

†Hunten, D. M., **Some photometric observations of auroral spectra**. *Journal of Atmospheric and Terrestrial Physics*, London, 7(3):141-151, Sept. 1955. 2 figs., 6 tables, 22 refs. **DWB**—Photoelectric spectra giving relative and absolute measures of the more prominent auroral features are illustrated and discussed. "Observations of H β seem to indicate more erratic behavior than has been assumed. The intensity of the N II lines 5001-5 Å shows little or no excitation by helium ions. A very intense feature observed in Type B red aurora appears to be due to sodium. The vibrational development of the N₂+ first negative system indicates electron excitation from the ground state of N₂ at a temperature of 0-700°K. The results show the spectrometer to be useful for intensity measurement and the observation of short-lived effects." (Same item as 7.2-279, *Met. Abstracts*.) *Subject Heading*: 1. Auroral spectra.—*From author's abstract*.

12B-94

551.501.3:551.521.326:551.594.5

Hunten, D. M.; Roach, F. E. and Chamberlain, J. W., **A photometric unit for the airglow and aurora**. *Journal of Atmospheric and Terrestrial Physics*, London, 8(6):345-346, June 1956. table, 5 refs. **DWB**—The quantity measured is the angular surface brightness B but the quantity required is the volume emission rate, which is ordinarily $4\pi B$. It is proposed that the unit of photometric measurements should be the "Rayleigh" $R=4\pi B=10^6$ quanta/cm² (column) sec. Some typical values are given. (Same item as 7.10 67, *Met. Abstracts*.) *Subject Headings*: 1. Night sky brightness measurement 2. Auroral luminescence 3. "Rayleigh" R unit.—*C.E.P.B.*

12B-95

523.77:551.594.5:551.521.326

Hunten, D. M. (*Univ. of Saskatchewan, Saskatoon*), **Recent work at the University of Saskatchewan on auroral and night sky spectra**. *Annales de Géophysique*, Paris, 14(2):167-173, April/June 1958. fig., 19 refs. French and English summaries p. 167. **DLC**—Some of the work of the past three years in spectroscopy of auroral and airglow at Saskatoon and also at Churchill is reviewed. Measurements of rotational temperature of the N₂⁺ band at 3914 Å are consistent with the expected gradient of 6°/km; this is true at Churchill as well. Special features observed include several bands of the N₂⁺ Meinel system: (0.0) at 11,100 Å and (0.1) and (1.2) near 15,000 Å. The (1.0) and (1.2) bands often have anomalous high intensity; it may be that they are excited preferentially by collision with O⁺(²D). Hydrogen lines appear further south in the stronger auroral displays, but other predictions of the Martyn theory are not confirmed. OH bands in the airglow have been observed out to 20,000 Å; the intensity of the (4,2) band has been measured as 175 kilorayleighs and the rotational temperature as 200°K. (Same item as 10.2-340, Feb. 1959, *Met. Abstracts*.) *Subject Headings*: 1. Auroral spectroscopy 2. Airglow spectroscopy 3. Rotational temperature 4. Saskatoon, Canada.—*Author's abstract*.

12B-96

551.594.5:550.38

Israël, Hans, **Extraterrestrische Einflüsse auf das luftelektrische Feld**. [Extraterrestrial influence on the atmospheric field.] *Germany. Deutscher Meteorologischer Dienst im Französischen*

Besatzungsgebiet, Wissenschaftliche Arbeiten, 1: 62-67, 1947. 2 figs., table, 17 refs. In German; German and French summaries p. 67. **DLC**—The four extraterrestrial causes of atmospheric electric charges which vary from day to day are: 1) cosmic rays, 2) corpuscular radiation from the sun, 3) UV discharges from the sun and 4) sunspot and related activity. Numerous attempts have been made since 1872 to show a quantitative relation between aurora and electric charge in the atmosphere. A chart (after J. SCHOLZ, 1935) shows a rise in the electric field, increase in current and conductivity about 15-20 min before an aurora and a sharp drop at onset to a minimum about 10 min after the onset of the aurora. Other authors' theoretical explanations of positive charge without aurora and negative or <positive during aurora are presented. (*Same item as 5.11-220, Met. Abstracts.*) *Subject Headings: 1. Atmospheric electricity 2. Auroral effects on geoelectric field.*—M.R.

12B-97

551.594.51:535.33:539.13

Jarman, W. R. and Fraser, P. A., **Transition probabilities of molecular band systems, Pt. 7, Two improvements in the analytic method of calculating approximate relative vibrational transition probabilities.** London, Ontario. Univ. of Western Ontario, Dept. of Physics, Contract AF 19(122)-470, Scientific Report, No. 11, Aug. 1, 1953. 19 p. 3 tables, 5 refs., numerous eqs. **DWB**—Two improvements in the approximate method of calculating vibrational transition probabilities presented in two previous reports of this series are given here. The first improvement allows treatment of cases where $|a_1 - a_2/a_1 + a_2|$ is so large ($\geq 5\%$) that the results using the approximate technique are merely indicative of trends. a_1 and a_2 are the parameters in the Morse potentials whose adjustment is the basis of the approximate method. The second improvement describes a method of overcoming the heavy cancellation (intrinsic in the wave functions) that limits the extent of tables of p-values. It is an amplification and extension of a short discussion in an appendix of a previous report. Formulae are given for the experimentally important 0, 1, 2 and 3 progressions in either direction. They allow the overlaps to be calculated to much higher quantum numbers than was possible before. *Subject Headings: 1. Molecular structure 2. Spectrographs.*—Authors' abstract.

12B-98

551.594.51:535.33

*Jarman, W. R.; Fraser, P. A. and Nicholls, R. W., **Transition probabilities of molecular band systems, Pt. 13, Collected Results N₂, NO, O₂, O₂, OH, CO, CO.** London, Ontario. Univ. of Western Ontario. Dept. of Physics, Contract AF 19(122)-470, Scientific Report, No. 18, Aug. 15, 1954. 14 p. 11 tables, 11 refs., eqs. **DWB**—In this report arrays of p-values are given for the following transitions:

N ₂	$a^1\Pi_g \rightarrow X^1\Sigma_g^+$	(Lyman-Brige-Hopfield)
NO	$B^2\Pi \rightarrow X^2\Pi$	(β bands)
O ₂	$A^3\Sigma_u^+ \rightarrow X^3\Sigma_g^-$	(Herzberg)
	$B^3\Sigma_u^- \rightarrow X^3\Sigma_g^-$	(Schumann-Runge)—(small p-values only)
O ₂	$b^4\Sigma_g^- \rightarrow a^4\Pi_u$	(First Negative)
OH	$A^2\Sigma^+ \rightarrow X^2\Pi$	
CO	$a^3\Pi \rightarrow X^1\Sigma^+$	(Cameron)
	$a^1\Sigma^+ \rightarrow a^3\Pi$	(Asundi)
CO	$A^3\Pi \rightarrow X^3\Sigma^+$	(Comet-tail bands)

Computational methods employed in obtaining these values are described in other reports. *Subject Headings: 1. Auroral physics.*—Authors' abstract.

12B-99

551.594.51:535.33

Jarman, W. R. and Nicholls, R. W., **Transition probabilities of molecular band systems, Pt. 14, r-Centroids: 'Average' Internuclear separations associated with molecular bands.** London, Ontario. Univ. of Western Ontario. Dept. of Physics, Contract AF 19(122)-470, Scientific Report, No. 20, March 1, 1955. 19 p. 3 figs., 8 tables, 6 refs., 24 eqs. **DWB**—The concept of an 'r-centroid' ($\bar{r}_{v'v''}$) associated with the radiation of the ($v' \rightarrow v''$) molecular band is discussed. $\bar{r}_{v'v''}$ is defined as

$$\frac{\int \varphi_{1v'}(r) r \varphi_{2v''}(r) dr}{\int \varphi_{1v'}(r) \varphi_{2v''}(r) dr}$$

A series of alternative methods of computation of arrays of $\bar{r}_{v'v''}$ are described and typical arrays for a few band systems are presented. The relationship between the r-centroid and the wavelength of the band is also discussed. *Subject Heading: 1. Spectral systems.*—Author's abstract.

12B-100

551.594.51:551.524.7

Jones, A. Vallance and Harrison, A. W., **Rotational temperatures of the auroral N₂⁺ bands.** *Journal of Atmospheric and Terrestrial Physics*, 6(6):336-343, June 1955. 5 figs., table, 10 refs. **DWB**—The basis of temperature computation from auroral spectra is discussed. Five plates of

3914 Å band were obtained with a high-dispersion spectrograph at Saskatoon and temperatures estimated. They ranged from 250–400°K but a considerable contribution from a region as low as 200°K is necessary to give the observed intensities. Some of the plots showed curvature attributed to variation of temperature with height in auroral region. (Same item as 6.10–287, *Met. Abstracts*.)
Subject Heading: 1. Auroral temperatures.—C.E.P.B.

12B–101

551.594.51:535.33:546.17

Jones, A. Vallance and Hunte, D. M. (both, *Univ. Saskatchewan*), **Rotational and vibrational intensity distribution of the first negative N_2^+ bands in sunlit auroral rays.** *Canadian Journal of Physics*, Ottawa, 38(3):458–476, March 1960. 7 figs., table, 35 refs., 11 eqs. DWB, DLC—Spectra of sunlit auroral rays were obtained from Saskatoon during the auroras of Sept. 3–4 and 4–5, 1958. The resolution of these spectra was sufficiently high to enable measurements to be made of the relative intensities of the lines of the 0–0 first negative N_2^+ band as well as the relative intensities of bands of the $\Delta v = -1$ sequence of this system. An analysis of the rotational line intensities shows they are consistent with an excitation process in which N_2^+ ions in thermal equilibrium with the atmosphere at 2200°K fluoresce under the influence of solar radiation. The vibrational intensity distribution also is consistent with a fluorescent excitation from a state of thermal equilibrium at about 2050°K. It is shown that the results are not consistent with a fluorescent excitation process in which the rotational and vibrational degrees of freedom of the N_2^+ ions come into radiative equilibrium with the solar radiation. Earlier conclusions that radiative equilibrium did hold for vibration are shown to be in error as a result of the high rotational temperature and the low dispersion used. It is concluded that the destruction of N_2^+ ions as a result of dissociative recombination proceeds sufficiently fast to prevent any significant approach to radiative equilibrium. This investigation provides a strong indication that the kinetic temperature of a sunlit auroral ray (perhaps in the 400–500 km region) is in the neighborhood of 2000°K. This may be somewhat higher than the temperature of the normal atmosphere at this height. (Same item as 11.10–173, *Met. Abstracts*.)
Subject Headings: 1. Sunlit auroral spectra 2. Auroral nitrogen bands 3. Auroral temperatures.—
Authors' abstract.

12B–102

550.385:551.594.5

Kaiser, T. R., **Relationships between auroral ionization and magnetic disturbance.** *Annales de Géophysique*, Paris, 14(1):76–79, Jan./March 1958. 3 figs, 7 refs. DLC—This report presents results from a detailed analysis of the correlation between characteristics of auroral ionization and geomagnetic disturbances. The magnetic disturbance is associated with spatially localized regions of intense ionization moving horizontally along a magnetic parallel of latitude. It suggests that, while the ionized clouds must preserve nearly electrical neutrality, there is a net drift of negative charge in the direction of motion of the ionization. This is from the dark to the sunlit hemisphere and is thus opposite to that predicted by MARTY in his extension of the Chapman-Ferraro corpuscular stream theory. It also appears that, for a given magnitude of magnetic disturbance, the ionization during positive bays is more intense than during negative ones. This supports the view that the morning maximum may become relatively less pronounced at higher radio-frequencies. (Same item as 10.1–359, *Met. Abstracts*.) **Subject Headings:** 1. Auroral ionization 2. Geomagnetic disturbances 3. Ionized clouds 4. Chapman-Ferraro theory.—A.V.

12B–103

535.41.551.594.5 535.41:551.521.326

†Karandikar, R. V., **Investigation of interferometric methods for auroral and airglow studies.** Boston Univ. Physical Research Labs., Contract AF 19(604)-2172, Final Report, Aug. 1959. 71 p. 7 figs., table, 70 refs. DWB (M(051) B747rep)—An investigation is made of the characteristics of Fabry-Perot interferometers and accessory optical and detecting systems suitable for the study of the auroral hydrogen lines and for the measurement of the Doppler width of the 8446 Å oxygen line in the aurora and the airglow with a view to deducing the temperature of the emission layer. On the basis of this investigation, a proper choice of the instrumental parameters is made and suitable low and high order Fabry-Perot interferometers as well as the auxiliary photographic and photoelectric recording systems are developed. The performance of these instruments is tested with the aid of laboratory sources and also by making some trial observations on the aurora and the airglow. **Subject Headings:** 1. Interferometry of aurora and airglow 2. Fabry-Perot interferometer 3. Emission layer temperature.—*Author's abstract.* ©

12B–104

551.594.5

Kariagina, Z. V., **Nizkoshirotnoe poliarnoe sijanie 29–30 sentiabria 1957 goda.** [Low latitude aurora of Sept. 29–30, 1957.] *Akademiia Nauk Kazakhskoi SSR. Astrofizicheskii Institut, Izvestiia*, 6:68–78, 1959. 7 figs., 5 tables, 6 refs., eqs. English summary p. 78. DLC—The results of visual and spectrophotometric observations of the low-latitude aurora of 29–30 Sept., 1957 are presented in this paper. The spectral features of this aurora are: 1) great intensity of the (OI) red line 6300

+6364 Å; 2) presence of the (N I) line at 5200; 3) great intensity of the bands of N_2^+ . The intensities of emission lines (5200, 5577, 5893, 6300 + 6364) and bands of the N_2^+ negative group are obtained in absolute units ($\text{erg cm}^{-2}\text{s}^{-1}\text{sterad}^{-1}$). *Subject Headings: 1. Low latitude auroras 2. Auroral spectra intensity.—Author's abstract.* ⑤

12B-105

551.521.326:551.594.1

†Khvostikov, I. A., *Svechenie nochnogo neba*. [Light of the night sky.] 2nd rev. ed. Moscow, Akademiya Nauk, 1948. 495 p. plates, diagrs., 434 refs., eqs. **DLC**—A most intensive and comprehensive text dealing with recent problems of the upper atmosphere such as the aurora, light of the night sky, the green line in the spectrum of the night sky and aurora, atomic dissociation of nitrogen oxygen and sodium, infrared radiation of the night sky, twilight phenomena associated with fluorescence or selective refraction, photometric analysis of zodiacal light, etc., polarizations of green line and other radiation, theories of light of the night sky, temperature in layers <120 km and 100–250 km, meteor trails, sunlit auroras, noctilucent clouds and many other problems. Extensive bibliography includes most of the important literature through 1947. (*Same item as 2.10.99 and 8B-34, Met. Abstracts.*) *Subject Headings: 1. Night airglow 2. Auroras 3. Twilight phenomena 4. Upper atmosphere research 5. Green auroral line 5. Auroral spectra.—M.R.*

12B-106

537.52:546.17

Kistiakowsky, G. B. and Berkowitz, J. (*Harvard Univ.*), **Mass spectrometric study of the kinetics of nitrogen afterglow** [Abstract]. (In: *The threshold of space*, ed. by M. Zelikoff. N. Y., Pergamon Press, 1957. p. 200.) **DLC**—Lewis-Rayleigh afterglow in nitrogen has been examined by simultaneous observation with a mass spectrometer and photomultiplier. Afterglow intensity was found to be proportional to the square of the concentration of the ^{14}S nitrogen atoms under a variety of conditions. The proportionality constant was unaffected by small oxygen addition, but was somewhat increased by the substitution of noble gases for nitrogen. A linear dependence of afterglow intensity on total pressure of nitrogen was observed at constant atomic concentration. The experimental data point to a thermomolecular reaction involving two ^{14}S nitrogen atoms and a molecule M . The value of the rate constant is about $2 \times 10^{-33} \text{ cc}^2\text{-molecule}^{-2}\text{-sec}^{-1}$. The detailed mechanism probably involves the intermediate formation of the $^{14}\text{S}_2^+$ molecular state, followed by a collision-induced, radiationless transition into the $^3\Pi_g$ state. "Detailed description of this work to appear in the *Journal of Chemical Physics*, under authorship of BERKOWITZ and KISTIAKOWSKY." *Subject Headings: 1. Nitrogen afterglow 2. Mass spectrometer analysis.—Authors' abstract.*

12B-107

551.594.5(52)

*Kitamura, Taiichi, **Visual aurora observation at Syowa Base, 1957/1958**. *Antarctic Record*, Tokyo, No. 5:18–39, Sept. 1958. 13 figs., 10 photos, 3 tables, 2 refs. In Japanese; English summary, p. 18. Appendix (10 p.) entirely tables. **DWB**—The results of the visual aurora observation at Syowa Base during the period March to October, 1957, covered the position of auroral maximum zone, the daily variations, the variations in the point of auroral arcs, the radiation of auroral corona as well as the northward shifts of the auroral arcs. The average values of the radiation points observed were $62^\circ.7 < h < 66.9^\circ$ where h is the altitude, and $-9^\circ.1 < Z < -5^\circ.1$ where Z represents the azimuth. A 5% error in this respect was estimated. Other details are analyzed. *Subject Headings: 1. Visual observation of auroras 2. Auroras 3. Syowa Base, Japan.—N.N.*

12B-108

551.594.51:551.521.67

Landseer-Jones, B. C., **The significance of a nonterrestrial magnetic field in neutral stream theories of the aurora**. *Journal of Atmospheric and Terrestrial Physics*, 6(4):215–226, April 1955. 7 refs., 12 eqs. **DWB**—The possibility that the existence of a nonterrestrial magnetic field in a neutral stream of ions, travelling from the sun with a speed of 10^8 cm/sec , would remove a serious difficulty in the way of explaining auroras by means of the stream when there is no such field, is examined. The analysis, which is intended to be exhaustive, leads to a process satisfactory for this purpose and needing a field in the same direction as the earth's and of a strength not less than 10^{-2} gauss, although other considerations make 10^{-6} gauss preferable. Other processes considered, requiring field strengths of at least 10^{-4} gauss, are rejected as implying great magnetic storms throughout every auroral display. It is also shown that a stream which is flowing uniformly in a magnetic field can never move out into field-free space. (*Same item as 6.8-352, Met. Abstracts.*) *Subject Headings: 1. Auroral theories 2. Corpuscular radiation.—Author's abstract.*

12B-109

551.594.51

McCarroll, R. J. and Wakely, P. G. (*Queen's Univ., Belfast*), **Transition probabilities for some lines of N II**. (In: *The airglow and the aurorae: a symposium*. London, Pergamon, 1956. p. 337–339. 3 tables, 11 refs., 2 eqs.) **DWB**—Hartree-Fock wave-functions have been obtained for the $(3d)^3p$, $(3d)^3D$, $(3d)^3F$, $(3p)^3P$ and $(3p)^3D$ terms of N II, and from these wave-functions various

transition probabilities have been computed, using both the dipole-length and dipole-velocity form of the transition integral. The two forms give satisfactory agreement and provide a basis on which to estimate the validity of the Coulomb approximation of BATES and DANGAARD. (*Same item as 8.7-344, July 1957, Met. Abstracts.*) *Subject Headings:* 1. Auroral physics 2. N II transition probabilities.—*Authors' abstract.*

12B-110

551.507.362.1:551.594.51:551.521.64

McIlwain, Carl, E. (*State Univ. of Iowa*), **Direct measurement of particles producing visible auroras.** *Journal of Geophysical Research*, Wash., D. C., 65(9):2727-2747, Sept. 1960. 30 figs., 24 refs. **DLC**—The nature of the particles producing two visible auroras at Fort Churchill, Canada, has been determined with the aid of rocket-borne detectors. Magnetic fields were used to separate the proton and electron components of the particle flux. It was found in each case that a major fraction of the auroral light was produced by electrons with energies of less than 10 kev. IGY rocket II6.26F was fired into a quiescent auroral glow of about intensity I. The integral number energy spectrum of protons incident upon the atmosphere during this flight was measured to be approximately $2.5 \times 10^6 \exp(-E/30)$ protons/sec cm² ster over the range 80 to 250 kev, where E is the proton energy in kev. The observed altitude dependence of the electron energy flux could have been produced by an integral number energy spectrum equal to $2.5 \times 10^9 \exp(-E/5)$ electrons/sec cm² ster over the range 3 to 30 kev. IGY rocket II6.27F was fired into a bright active auroral arc. At least 75% of the light in this aurora was produced by nearly monoenergetic electrons with about 6-kev energy. The electron flux varied rapidly with time; peak values were about 5×10^{10} electrons/sec cm² ster. The presence of monoenergetic electrons strongly suggests an electrostatic acceleration mechanism. *Subject Headings:* 1. Auroral particles 2. Auroral proton streams 3. Auroral electrons 4. Rocket.—*Author's abstract.* ⑤

12B-111

551.594.5:550.385:551.510.535:539.19

†Matsushita, S. (*High Altitude Obs. of the Univ. of Colorado, Boulder*), **Some studies of the upper atmosphere in the auroral zone.** *Annales de Géophysique*, Paris, 14(4):483-491, Oct./Dec. 1958. 3 figs., 28 refs. French and English summaries p. 483. **DLC**—Relations between ionospheric and geomagnetic phenomena in the auroral zone were studied from magnetograms and ionograms both made at the same station by correlating striking features in each. When a bay disturbance of moderate range occurred at night, complete blanketing of F2 by sporadic E always happened at the time. When the range of bays was larger, blackouts usually occurred after the incidence of complete blanketing of F2. Slant Es occasionally appeared during bays, and it never occurred except during bays or bay-type variations during magnetic storms. Blackouts which occurred during daylight hours had no remarkable correlations with geomagnetic variations except during magnetic storms. In other words, there were two different types of the polar blackout: nighttime and daytime types. The height of the absorbing region responsible for the polar blackout during daylight hours seemed to be lower than that at night. In order to explain these results, the effect on the ionosphere of X-rays generated by the primary particles from the sun are discussed. The cause of magnetic bay disturbances is also considered. (*Same item as 10.8-360, Met. Abstracts.*) *Subject Headings:* 1. Auroral zones 2. Magnetic storms 3. Polar blackouts 4. X-ray effect on ionosphere 5. Magnetic bay disturbances.—*Author's abstract.*

12B-112

551.594.51:550.38:551.510.535

Meek, J. H. (*Physics Dept., Saskatchewan Univ., Saskatoon, Canada*), **Correlation of magnetic, auroral, and ionospheric variations at Saskatoon, Pt. 2.** *Journal of Geophysical Research*, Wash., D. C., 59(1):87-92, March 1954. figs., 8 refs. **DLC**—The relations between magnetic, auroral, and ionospheric observations are summarized with reference to the occurrence of positive and negative magnetic bays. Auroral light associated with positive bays occurs at a higher geomagnetic latitude than that associated with negative bays. The magnetic and auroral light variations are compared to MARTYN's theory of the aurora. If the latter is accepted, the conclusion is reached (1) that most auroras are caused by positively charged particles, and (2) that the conditions described for the early phase actually exist throughout most of a disturbance. (For Pt. 1, see 5C-260, March 1954, IAB.) (*Same item as 6.10-288, Met. Abstracts.*) *Subject Headings:* 1. Auroral intensity variations 2. Auroral-ionospheric relationships 3. Auroral-magnetic relationships 4. Martyn's auroral theory.—*Author's abstract.*

12B-113

551.594.51

Meek, J. H., **The location and shape of the auroral zone.** *Journal of Atmospheric and Terrestrial Physics*, 6(6):313-321, June 1955. 7 figs., 13 refs. **DWB**—Variations of the earth's magnetic field have been examined, using data of the Polar Year 1932-33. It is concluded that the auroral zone takes the form of two opposing Störmer-like spirals, one due to positive-particle precipitation

and the other due to negative-particle precipitation. These spirals intersect each other at a high latitude at about 10 a.m. local geomagnetic time, and at a lower latitude at about 10 p.m., and move around the earth with the sun. It is proposed that the disturbance-particle stream coming from the sun is not necessarily continuous or uniform. As it passes the earth, charged particles are ejected from it and follow Störmer trajectories into the auroral zone, resulting in the observed auroral light displays and magnetic disturbances. Some of the observed characteristics of aurora are discussed in view of this proposal. (Same item as 6.10-289, Oct. 1955, *Mel. Abstracts*.) *Subject Headings:* 1. Auroral theories 2. Auroral zones.—*Author's abstract.*

12B-114

551.594.51 551.521.32

†Meinel, A. B., The spectrum of the airglow and the aurora. *Physical Society of London, Reports on Progress in Physics*, 14:121-146, 1951. 5 figs., 8 tables, 60 refs. **DLC**—Begins with an account of the spectrum of the night sky from 3000-14,000 Å, consisting of bands due to various gases and a continuous background of uncertain origin. It is attributed to region below 120 km. The characteristic spectrum of the twilight glow is briefly described, and the spectrum of the aurora is discussed and illustrated in detail. The atomic and molecular processes involved are discussed. Temperature estimates from the aurora diverge widely. (Same item as 3.3-258 and 8B-56, *Mel. Abstracts*.) *Subject Headings:* 1. Night airglow spectrum 2. Auroral spectra.—*C.E.P.B.*

12B-115

551.594.51:535.33:546.1

†Meinel, A. B. (*Yerkes Obs., Williams Bay, Wisc.*), Protons and the aurora. *U. S. Air Force Cambridge Research Center, Geophysical Research Papers*, No. 30:41-59, July 1954. 6 figs., 21 refs. Discussion p. 53-58. **DLC**—The importance of the discovery by VEGARD of hydrogen Balmer emissions in some auroras in 1939 was not fully realized for many years. As a rule, the hydrogen alpha and hydrogen beta lines were not present in his spectra; only occasionally did these emissions appear strongly. The opportunity to determine whether the hydrogen lines showed any Doppler displacement occurred during the great auroras of 18-20 Aug. 1950. Spectra were obtained of the hydrogen alpha region with a high resolution spectrograph pointed towards the magnetic zenith and towards the north magnetic horizon. Spectra of a quiet auroral arc at the magnetic horizon showed a strong, undisplaced, but broadened hydrogen alpha line. The line was completely symmetrical and unaffected by the adjacent, but relative weak first positive bands of molecular nitrogen. Spectra of another quiet arc passing through the magnetic zenith, on the other hand, showed a very asymmetrical hydrogen alpha profile. The violet wing of H α was shifted 71 Å, while the maximum was displaced 10 Å. The asymmetrically displaced hydrogen alpha profile showed conclusively that high velocity protons were impinging on the high atmosphere and that they were being sharply decelerated in passing through it. The violet wing displacement corresponds to a velocity of 330 km/sec, equivalent to an energy of 57 keV, which is considerably in excess of velocities for auroral particles as estimated by indirect means. On both nights the successive auroral stages consisted of the formation of a quiet arc phase. As soon as the arc broke up into rays, streamers, and pulsating surfaces, the hydrogen alpha line faded away. As to the penetration of auroral particles: electrons of the same energy as protons will penetrate farther, but electrons of the same velocity as protons will penetrate less. (Same item as 6.11-359, *Mel. Abstracts*.) *Subject Headings:* 1. Auroral spectra 2. Balmer lines 3. Auroral hydrogen lines 4. Protons.—*Author's abstract.*

12B-116

551.521.18:551.594.51:535.3

Meinel, A. B. (*Yerkes Obs., Wisc.*), The near-infrared spectrum of the aurora. *U. S. Air Force Cambridge Research Center, Geophysical Research Papers*, No. 30:75-94, July 1954. 11 figs., 17 refs. Discussion p. 87-93. **DLC**—The study of the infrared auroral spectrum has provided a greater insight into the physical state of upper atmospheric gases during an auroral display. The chief results of the study of this spectral region have been the conclusive identification of permitted atomic lines of (OI) and (NI) and the new identification of two band systems, one of which is still unobserved in the laboratory. The new band system has been identified as being due to the A $^2\Pi$ -X $^2\Sigma$ transition of N $_2^+$. This identification, based solely upon the derived molecular constants, is unique in that these bands have never been obtained in the laboratory, although the A $^2\Pi$ level is known to exist through perturbation in the high vibrations states of the ground X $^2\Sigma$ state of N $_2^+$. The B $^3\Pi$ -A $^2\Sigma$ first positive system of molecular nitrogen is responsible for the most intense features of the infrared auroral spectrum in this wave length range. The intensities of the bands change with vibrational number in an orderly manner, indicating that no selective effects are present. (Same item as 6.10-165, *Mel. Abstracts*.) *Subject Headings:* 1. Infrared spectrum of aurora 2. Auroral spectra.—*From author's abstract.*

12B-117

551.594.5

Meredith, L. H.; Gottlieb, M. B. and Van Allen, J. A. (*Univ. of Iowa, Dept. of Physics*), Direct detection of soft radiation above 50 kilometers in the auroral zone. *Physical Review*, New York

2nd Ser., 97(1):201-205, Jan. 1, 1955. 4 figs., 3 tables, 7 refs. **DLC**—In two high-altitude rocket flights of thin-walled Geiger tubes at geomag. lat. 64° and 74°N , a considerable intensity of soft radiation has been encountered above 50 km altitude. No such radiation has been found in flight of identical equipment at 88.5° and at 55.6° . The radiation is tentatively interpreted as the high-energy tail of the auroral spectrum. It may consist of electrons. (*Same item as 6.10-290, Oct. 1955, Met. Abstracts.*) *Subject Headings: 1. Auroral radiations.—Authors' abstract.*

12B-118

551.594.51:537.52:546.17

Mitra, Sisir Kumar, **Active nitrogen—a new theory**. Calcutta, Indian Association for the Cultivation of Science, 1945. 73 p. 19 figs., refs., eqs. **Discussion** by Joseph Kaplan in *Physical Review*, 73(5):494-496, March 1, 1948. 2 figs., 3 refs., 2 eqs. **Reply** by Mitra *Ibid.*, 74(11):1637-1639, Dec. 1, 1948. 5 refs., eqs. **DLC**—A theory is proposed for the Lewis-Rayleigh afterglow of nitrogen. Although the excitation mechanism is mainly introduced in connection with discharge tubes, it is applicable to the auroral afterglow. The basic reaction involved in the theory is the three-body collision $\text{N}_2^+(\text{X}') + e + \text{N}_2 = \text{N}_2(\text{B-state}) + \text{N}_2(\text{A-state})$. J. KAPLAN believes that the presence of ions in the $\text{N}_2^+(\text{X}')$ in the auroral afterglow is evidence against the mechanism proposed by author. KAPLAN suggests that the basic reactions in nitrogen afterglow, and probably auroras, are the dissociative recombination $\text{N}_2^+ + e = \text{N}' + \text{N}''$ and collision of the second kind involving very slow electrons and metastable atoms. In his reply MITRA reasserts the validity of his own theory. (*Same item as 6E-59, Met. Abstracts.*) *Subject Headings: 1. Auroral afterglow 2. Nitrogen afterglow.—G.T.*

12B-119

551.594.51

Montalbetti, R. and Jones, A. Vallance, **H α emissions during aurorae over west-central Canada**. *Journal of Atmospheric and Terrestrial Physics*, 11(1):43-50, 1957. 3 figs., 5 tables, 12 refs. **DWB**—D. F. MARTYN's theory of the aurora is set out. It was tested by spectral observations at Churchill and Saskatoon. At Churchill 2 or 3 spectra were obtained each night, at Saskatoon 1 or 2. The diurnal variations do not support MARTYN's theory, showing a tendency for H α to occur more strongly before midnight at Saskatoon and after midnight at Churchill. During strong aurora H α emission tends to be observed simultaneously at both stations. At Churchill there is negative correlation between H α intensity and magnetic activity, at Saskatoon positive. The zone of maximum proton moves south as magnetic disturbance becomes greater. (*Same item as 8.11-273, Met. Abstracts.*) *Subject Headings: 1. Auroral theories 2. Martyn's auroral theory.—C.E.P.B.*

12B-120

551.594.5:551.521.326:539.1

Morel-Viard, Jeannine, **Luminosité aurale produite par des protons de direction quelconque**. [Auroral luminosity produced by protons from an arbitrary direction.] *Académie des Sciences, Paris, Comptes Rendus*, 243(3):292-295, July 16, 1956. fig., 6 refs. **DLC**—A beam of monokinetic protons is considered, which enters the atmosphere at an arbitrary angle to the line of power of the geomagnetic field. The luminosity associated with each value of angle of incidence is calculated as a function of altitude and from this the curve of total luminosity is derived. (*Same item as 9.10-305, Met. Abstracts.*) *Subject Headings: 1. Auroral luminosity 2. Protons.—Transl. of author's abstract.*

12B-121

551.594.51:535.33

Muliarchik, T. M., **Interferometricheskoe izmerenie shirin emissii $\lambda 6300$ Å (OI) i $\lambda 5198$ -5200 Å (NI) v poliarnykh siiiianiakh**. [Interferometer measurement of $\lambda 6300$ Å (OI) and $\lambda 5198$ -5200 Å (NI) emissions from auroras.] *Akademiia Nauk SSSR, Doklady*, 130(2):303-306, 1960. 4 figs., 7 refs. **DLC**—In this interferometric measurement of the forbidden emission of auroras, individual emissions were separated by filters with transmission bands of 80-100 Å. Quartz interference rings 8 and 10 mm in diameter were used to photograph the red oxygen line. The interferometer was placed in a hermetically sealed chamber and both were placed in a heat-insulated box in which the temperature was maintained constant within $\pm 0.5^\circ\text{C}$. Photographs of the interference rings of the $\lambda 6300$ Å line (OI) and of the yellow krypton line and of the forbidden doublet of nitrogen $\lambda 5198$ -5200 Å and a photometric section of the internal $\lambda 6300$ Å ring are presented. The temperatures determined from the width of the red line were between 1200 and 3400°K . The accuracy of all cases was $\pm 15\%$. The mean temperature of these photographs was $1210 \pm 50^\circ\text{K}$. A tendency to increase in temperature with increase in illumination brightness was observed. In type A auroras there was a temperature of about 1500°K . When the intensity of line $\lambda 6300$ Å was 2-5 kilo Rayleigh and 1700-2000°K with an intensity 5-15 kilo Rayleigh, the ratio of the intensities of the doublet components 5198 5200 Å was $I_{5200}/I_{5198} = 1.7 \pm 0.1$. The temperatures determined from the width of 5200 Å were $1850 \pm 250^\circ\text{K}$ for the first photograph and $2000 \pm 300^\circ\text{K}$ for the second one. (*Same item as 11.10 181, Met. Abstracts.*) *Subject Headings: 1. Forbidden [OI] lines 2. Auroral emissions 3. Auroral temperatures.—I.L.D.*

12B-122

551.594.51:537.13:551.501.8

Murcray, W. B. and Pope, J. H. (*both, Geophys. Inst. Univ. Alaska, College, Alaska*), **Radiation from protons of auroral energy in the vicinity of the earth.** *Journal of Geophysical Research*, Wash., D. C., 65(11):3569-3574, Nov. 1960. 3 figs., 10 refs., eq. **DWB, DLC**—Some considerations regarding the way in which auroral protons might be expected to radiate as they approach the earth are discussed. The form of the frequency-time curves which might result at the earth's surface from the radiation by such particles are deduced by assuming a reasonable model of the upper ionosphere. It is concluded, at least so far as the frequency-time curves are concerned, that auroral protons are capable of producing the low-frequency electromagnetic phenomenon known as "Chorus." *Subject Headings: 1. Auroral proton streams 2. Dawn chorus.—Authors' abstract. ©*

12B-123

551.594.52

Neobychne poliarnye siianiia v 1957 godu. [Unusual auroral displays in 1957.] *Priroda*, Moscow, 47(4):81-83, April 1958. **DLC**—The year 1957 was one of unusual auroras, which extended in some instances to points where they are extremely rare. Very unusual was the aurora of Sept. 4-5, 1957, which was observed in the southern and eastern parts of the U.S.S.R. Reports on the appearance of this aurora; the aurora of Sept. 29-30 and of Jan. 21-22, 1957 are summarized. *Subject Headings: 1. Auroral descriptions 2. Auroral types 3. U.S.S.R.—I.L.D.*

12B-124

551.594.51:537.523

Nicholls, R. W., **Excitation of molecular spectra. Pt. 1: The ionization in air maintained by a uniform plane circular distribution of α -radioactivity.** London, Ontario. Univ. of Western Ontario. Dept. of Physics, Contract AF 19(122)-470, Scientific Report, No. 2, Nov. 1, 1952. 6 p. 2 figs., 3 eqs., 8 refs. **DWB.** Also his: **Pt. 2, The high-voltage arc in an argon-nitrogen mixture.** *Ibid.*, Scientific Report, No. 6, Jan. 10, 1953. 9 p. 2 figs., 10 refs. **DWB**—In the first part, the electrical and spectroscopic characteristics of high voltage (1-2 KV) A.C. arcs at 60 cycles were studied in ordinary argon-nitrogen filled light bulbs whose filaments were destroyed. Spectra (with exposures of 1-24 hours) in range from 3500-12,000 Å show selected bands of second and first positive N_2 systems only, and surprisingly low vibrational excitation. In the second part, the rate of ionization in air in the region of a uniform plane circular distribution of α radioactivity was computed and is shown graphically to reveal the lower limit of excitation rate maintained by the same source, for use in interpretation of spectroscopic experiments in excitation of radiation by passage of positive (α particles) ions, through gases. *Subject Headings: 1. Molecular spectra 2. Auroral physics 3. Radioactive ionization.—From author's abstract.*

12B-125

551.594.51:535.33

Nicholls, R. W., **Transition probabilities of molecular band systems, Pt. 1, Transition probabilities and intensities of molecular spectra.** London, Ontario. University of Western Ontario. Dept. of Physics, Contract AF 19(122)-470, Scientific Report, No. 3, Nov. 20, 1952. 26 p. 2 figs., 22 refs., 46 eqs. **DWB**—Deals with diatomic molecular spectra, a study made for the computation of the spontaneous total and vibrational "fractional" transition probability for bands and band systems occurring in the aurora. Vibrational wave functions and electronic transition moments are derived and the band intensities between systems compared. An electronic multiplying and integrating machine is constructed for the computation work. *Subject Headings: 1. Auroral spectra 2. Spectroscopy.—Author's abstract.*

12B-126

551.594.51:551.521.18:546.17

Nicholls, R. W. (*U. West Ontario, London, Canada*), **Relative vibrational transition probabilities and r -centroids for the Meinel ($A^2\Pi - X^2\Sigma$) band system of N_2^+ .** *Journal of Atmospheric and Terrestrial Physics*, London, 12(2/3):211-214, 1958. 2 tables, 10 refs., 2 eqs. **DLC**—The recent measurements of OMHOLT (1957) upon intensities $I_{v'v''}$ of the red and near infrared auroral spectrum have provided valuable information from which may be derived smoothed relative vibrational transition probabilities $p_{v'v''}$ for the Meinel System ($A^2\Pi - X^2\Sigma$) of N_2^+ together with an indication of the dependence of electronic transition moment $R_e(r)$ with internuclear separation r for the system. The purposes of this note are therefore (a) to provide a set of smoothed relative vibrational transition probabilities $p_{v'v''}$ and intensities at infinite temperature I_∞ (equal population $N_{v'}$ of upper levels v') for the strongest bands of the system, (b) to provide a set of r -centroids $\bar{r}_{v'v''}$ for the system and (c) to discuss the probable behavior with internuclear separation r of the electronic transition moment $R_e(r)$. *Subject Headings: 1. Infrared auroral emissions 2. Nitrogen spectra.—From author's introduction.*

12B-127

551.521.326:551.510.535:551.594.51

Nicolet, Marcel, **Deductions regarding the state of the high atmosphere.** (In: International Conference on the Emission Spectra of the Night Sky and Aurorae. London, 1947, **Papers.** pub.

1948. p. 36-48. 4 tables, 5 refs., 35 eqs.) DWB—Author states that he believes: (1) the normal production of the night sky light is by recombination, with selective emission; (2) nonuniformity of emission is related to ionospheric structure, meteors, etc. which vary in space and time; (3) night sky light intensity correlates with magnetic activity; (4) atmospheric equilibrium is destroyed during ionospheric and magnetic storms and auroral emission; the spectral distribution becomes more uniform as the direct effect of the corpuscles increases. Detailed treatment of identifications of spectra; photodissociation and photoionization; molecular recombination, ionic recombination, collisions between negative ions and neutral atoms, and application to forbidden transitions is given. (Same item as 8B-35, *Mel. Abstracts*.) *Subject Headings*: 1. Night airglow 2. Auroral emission 3. Ionospheric structure 4. Ionization phenomena.—M.R.

12B-128

551.521.326:551.594.51:535.33

Nicolet, M., *Problèmes de l'émission spectrale du ciel nocturne et des aurores*. [Problems of the spectral emission of the night sky and of auroras.] *International Council of Scientific Unions, 7th Report of the Commission for the Study of Solar and Terrestrial Relationships*. pub. Paris, 1951. p. 165-182. table, 38 refs. DWB—Three symposia in 1947 initiated important progress. Known radiations from the night sky are tabulated but altitudes and temperatures of the emitting layers are mostly uncertain. From night sky and auroral radiations some conclusions are drawn about vertical changes of composition of the atmosphere. Chemical and physical processes are discussed. Twilight observations are based on dissociation of N_2 at very high levels. (Same item as 3.7-121 and 8B-57, *Mel. Abstracts*.) *Subject Headings*: 1. Night airglow 2. Auroral spectra.—C.E.P.B.

12B-129

551.521.326:535.33 551.594.51:535.33

†Nicolet, Marcel, *Problèmes de l'émission spectrale de la lumière du ciel nocturne et des aurores*. [Problems of the spectral emission of the light of the night sky and of auroras.] *International Council of Scientific Unions, Brussels, Eighth Report of the Commission for the Study of Solar and Terrestrial Relationships*. Paris, 1954. p. 123-156. 208 refs., eqs. DWB—This systematic review of the voluminous literature from 1950-1954 is classified as follows: Spectroscopic analysis; identification of the spectrum of light of the night sky; identification of the auroral spectrum; characteristics of the principal radiations of the night sky; twilight conditions; considerations on the oxides of nitrogen and their nocturnal light; principal characters of the auroral emission. The main points are the new data on the energy of dissociation and emission spectra of oxygen and nitrogen, the calculation of the theoretical transitions of vibration and rotation which clarifies the structure of atmospheric emissions (though the interpretation of the numerous observations of night sky light is not yet clear) and the progress in the physics of aurora (identification of O and bands of N_2 , temperatures based on the structure of rotation, and analysis of radio reflections). (Same item as 8B-106, *Mel. Abstracts*.) *Subject Headings*: 1. Night airglow spectrum 2. Auroral spectra.—C.E.P.B.

12B-130

550.385:550.388.8:551.594.5

Nikolskiĭ, A. P., *O planetarnom raspredelenii magnitno ionosfernnykh nozmushchenii i poliarnykh silanii*. [World-wide distribution of magneto-ionospheric disturbance and aurora.] *Akademiia Nauk SSSR, Doklady*, 115(1):84-87, 1957. 3 figs., 9 refs. DLC. English transl. by E. R. Hope issued as *Canada. Defence Research Board, Translation*, T-266-R, Oct. 1957. DWB—World-wide data on anomalous ionospheric absorption are interpreted according to Störmer's spiral model of solar corpuscular radiation distribution in the Arctic. Four zones of maximum incidence of corpuscular radiation are derived (extending into equatorial latitudes) and traced on a Northern Hemisphere chart. The existence of similar zones in the Southern Hemisphere is assumed and it is suggested that the intensification of magnetic activity at the equator might be explained by the overlapping of the two hemispheric distributions. *Subject Headings*: 1. Störmer ring 2. Solar corpuscular influence on upper atmosphere 3. Auroral zones 4. Translations.—G.T.

12B-131

551.594.52

Nordlichtbeobachtungen. [Auroral observations.] *Zeitschrift für Meteorologie*, Berlin, 11(12):380-382, Dec. 1957. 4 figs. DWB, DLC—Description of auroral displays are presented. The localities and dates are as follows: Neustrelitz—Sept. 6, 1957; Angermünde—Sept. 13, 1957; Collmberg—Sept. 22, 1957; Sept. 23, 1957, and Sept. 29-30, 1957; Neustrelitz—Sept. 29, 1957 and Frankfurt (Oder)—Sept. 29, 1957. *Subject Headings*: 1. Auroral observations 2. Germany.—I.L.D.

12B-132

551.521.67:551.510.535

Obayashi, Tatsuzo and Hakura, Yukio (both, *Radio Res. Lab. Nakaminato-shi, Ibaragiken, Japan*), *Solar corpuscular radiation and polar ionospheric disturbances*. *Journal of Geophysical Research*, Wash., D. C., 65(10):3131-3142, Oct. 1960. 9 figs., 3 tables, 27 refs. DLC—Study of

disturbances in the polar ionosphere yields considerable evidence of the existence of energetic solar particles associated with solar flares. Radio blackouts due to enhanced ionizations are classified into two characteristic types: the polar-cap blackout, and the auroral-zone blackout. It is shown that the polar-cap blackout appears with some hours' delay after a major solar radio out-burst of type IV, and is confined within the geomag. lat. of about 60° to 65° . The estimated energies of particles causing it are of about 10 to 100 Mev. The auroral-zone blackout then follows, accompanied by geomagnetic storms and auroras; it may be caused by the so-called auroral particles of 1 Mev or less. The energy spectrum of solar particles associated with solar flares is discussed in view of the present results and of information from various observations of solar and terrestrial disturbances. It is concluded that solar particles have a conspicuous suprathermal non-Maxwellian tail extending from a few kev up to relativistic energy ranges, though the main part of corpuscular clouds consists of particles of rather low energy, which therefore are likely to be in the Maxwellian distribution. The nature of solar corpuscular clouds and their effect upon the terrestrial ionosphere are also discussed. *Subject Headings:* 1. Polar blackouts 2. Solar-ionospheric relationships 3. Solar corpuscular effects on upper atmosphere.—*Authors' abstract.* ⑤

12B-133

551.594.51:546.17

Omholt, Anders, **Intensity measurements of the second positive band system of nitrogen in high-latitude aurorae.** *Journal of Atmospheric and Terrestrial Physics*, 6(1):61-63, Jan. 1955. 3 tables, 7 refs. DWB—Two good spectra obtained at Tromsø with a 2-prism spectrograph at zenith distance 60° are tabulated and compared with those of a nitrogen lamp. Relative values can hardly be explained by supposing that only electrons take part in the excitation process. (*Same item as 6E-178, Met. Abstracts.*) *Subject Headings:* 1. Auroral spectra 2. Nitrogen spectra.—*C.E.P.B.*

12B-134

551.521.64:551.594.5:551.510.535

Omholt, Anders, **The auroral E-layer ionization and the auroral luminosity.** *Journal of Atmospheric and Terrestrial Physics*, 7(1/2):73-79, Aug. 1955. 2 figs., table, 10 refs., 10 eqs. DWB—The processes causing increase in E layer ionization during magnetic storms and auroras are discussed. It is shown that the recombination coefficient can be derived from simultaneous measurements of the photon emission within the first negative nitrogen band and the maximum electron density in the E region. Equipment and observations are described. The recombination coefficient during auroras is $>10^{-7}$ cm³ sec⁻¹. In medium to strong auroras the mean electron density is $2-10 \times 10^6$ cm⁻³. VHF radio echoes require localized electron densities of about 1.4×10^8 cm³, which though high may not be impossible. The variations of some parameters with height are discussed. (*Same item as 7.1-230, Met. Abstracts.*) *Subject Headings:* 1. Auroral luminosity 2. E layer ionization.—*C.E.P.B.*

12B-135

551.594.51

Omholt, Anders and Harang, L., **Measurements of the mean lifetime of the metastable 'S'-state of the oxygen atom in the upper atmosphere during auroral displays.** *Journal of Atmospheric and Terrestrial Physics*, 7(4/5):247-253, Oct. 1955. 3 figs., table, 6 refs., 9 eqs. DWB—The intensity variations of the green oxygen line 5577 Å ('D-'S) and the first negative nitrogen band 4278 Å ($N_2 +$, $B^2\Sigma_u = -X^2\Sigma_g +$) are measured in rapidly changing auroras. The mean lifetime of the upper state of the nitrogen band is of the order 10^{-8} sec, the intensity variation of this band will probably therefore at the same time represent the instantaneous relative excitation rate of the metastable OI 'S-level. The mean lifetime of the metastable OI 'S-level is theoretically calculated to be of the order $\tau = 0.75$ sec (GARSTANG, 1951). One should therefore expect a time-lag in the intensity curve of the 5577-line relative to the 4278-band. This effect is demonstrated on the records, and the mean lifetime of the OI 'S-level is found to vary between 0.45 and 0.75 sec. The upper value (0.75 sec) confirms the theoretical value found by GARSTANG (1951), the lower value found indicates that a probability of collisional deactivation of the metastable OI 'S-level of the order 1 sec^{-1} may appear in the auroral region of the upper atmosphere. (*Same item as 7.3-293, Met. Abstracts.*) *Subject Heading:* 1. Auroral physics.—*Authors' abstract.*

12B-136

551.594.51:535.33

Omholt, Anders (*Auroral Obs., Tromsø, Norway*), **Intensity measurements of the green auroral oxygen line and the negative nitrogen bands emitted from rapidly varying aurorae.** (In: *The air-glow and the aurorae: a symposium.* London, Pergamon, 1956. p. 178-182. 3 figs., 8 refs., 3 eqs.) DWB—Photoelectric measurements have been made of the intensities of the forbidden oxygen line 5577 Å and the negative nitrogen band 4278 Å emitted from auroras which give rapid intensity variations within a fixed volume of the upper atmosphere (moving or pulsating forms). The lifetimes of the oxygen atoms in the metastable 'S' state in the auroras have been calculated, assuming the excitation rates of the two emissions to be proportional, and the observed time delays between the

two emissions to be due to this lifetime. The records are consistent with these assumptions, and give lifetimes of the metastable $\text{OI}'\text{S}$ state during these aurorae of the order 0.45 to 0.75 sec. (*Same item as 8.9-326, Met. Abstracts.*) *Subject Heading: 1. Auroral spectral intensity.*—*Author's abstract.*

12B-137

551.594.51:551.521.67

Omholt, Anders, **Characteristics of auroras caused by angular dispersed protons.** *Journal of Atmospheric and Terrestrial Physics*, London, 9(1):18-27, July 1956. 3 figs., table, 29 refs., 18 eqs. **DWB**—CHAMBERLAIN's proposal that auroral arcs are caused by monoenergetic protons with a certain dispersion in direction is considered. Calculations are carried out on the luminosity curves of the main auroral features and of the Balmer lines, and on the Doppler profile of these latter viewed in the direction of the magnetic horizon. For the main features the computed luminosity curves are in moderate accord with the observed. Reliable observations are lacking in the case of the Balmer lines. According to the calculation, these lines should become narrower as the altitude within an aurora is decreased. The computed profiles are not in agreement with the observed, unless the recorded light originated from the lowest part of each of the auroras studied. (*Same item as 7.11-305, Met. Abstracts.*) *Subject Headings: 1. Auroral particles 2. Solar protons.*—*Author's abstract.*

12B-138

551.594.51:546.17

†Omholt, Anders, **Secondary processes due to absorption of the Lyman lines emitted from aurorae.** *Journal of Atmospheric and Terrestrial Physics*, London, 9(1):28-35, July 1956. 2 tables, 33 refs., 22 eqs. **DWB**—The processes considered are the ionization of nitric oxide in the lower ionosphere by the $\text{HL}\alpha$ line, and the excitation of $\text{OI } \lambda 8446$ by resonance absorption of the $\text{HL}\beta$ line. Comparison with the intensity of $\text{HL}\alpha$ emitted from the quiescent sun suggests that $\text{HL}\alpha$ emitted from aurora may give an appreciable contribution to the ionization, but not the full amount required for polar blackouts. The excitation of $\text{OI } \lambda 8446$ by absorption of $\text{HL}\beta$ is found to be unimportant in ordinary auroras. (*Same item as 7.11-306, Met. Abstracts.*) *Subject Headings: 1. Auroral nitrogen lines 2. Auroral physics.*—*Author's abstract.*

12B-139

551.594.51

Omholt, Anders (*Auroral Obs., Tromsø, Norway*), **Excitation and ionization by secondary electrons in aurorae.** Chicago. Univ. Yerkes Obs., Contract AF 19(122)-480, 1957. 7 p. figs., 9 refs., 4 eqs. **DWB** (523.59 Y47t)—Illustrative computations on the excitation and ionization by secondary electrons have been carried out. It is shown that, for auroras caused by fast incident particles, one should expect the ratio between the rates of excitation of the red and green $[\text{OI}]$ lines to be higher than 12. The relative rates of excitation of the green $[\text{OI}]$ line and the first Negative N_2 bands are much more dependent on the energy distribution of the ejected secondary electrons, but the theoretical estimates are in reasonable agreement with the observed auroral intensities. (*Same item as 9.8-284, Met. Abstracts.*) *Subject Heading: 1. Auroral energy excitation mechanism.*—*Author's abstract.*

12B-140

551.594.51:535.33

Omholt, Anders, **Noen nyere underskelser av nordlysets spektrum.** [Some recent investigations of the aurora borealis spectrum.] *Fry Fysikkens Verden*, Blindern, Norway, 20(1):10-23, May 1958. 6 figs. **DLC**—After briefly reviewing the work of the last 50 years, some results of recent research are discussed. Particularly the weak $\text{H}\alpha$ lines are studied for a plausible interpretation. It is thought that more and better observations may bring information on the mechanism of proton acceleration. Finally, the three strangers of the forbidden oxygen lines, the wave lengths 5577, 6300 and 6364 Å responsible for the red color in aurora borealis are taken up. *Subject Headings: 1. Aurora borealis 2. Auroral spectra.*—*W.N.*

12B-141

551.594.51:535.33

The origin of the aurora. *Current Science*, Bangalore, 26(9):280-281, Sept. 1957. **DWB**—In Aug. 1950, A. B. MEINEL, at Yerkes Obs. in the U. S., recorded two spectra which proved the presence of hydrogen in auroral regions. This hydrogen moves at high speed through the upper atmosphere; 2000 mi/sec in the direction of the lines of force of the earth's magnetic field. This confirms the fact that protons or hydrogen nuclei are contained in the particle stream from the sun. (*Same item as 10.4-317, Met. Abstracts.*) *Subject Headings: 1. Solar proton theories 2. Auroral spectra.*—*N.N.*

12B-142

551.594.5

Paton, J., **The polar aurora.** *Royal Meteorological Society, Quarterly Journal*, 82(354):396-408, Oct. 1956. 6 figs., 43 refs. **DWB**—This Symons Memorial Lecture first summarizes the history of observation and theory, culminating in the work of K. BIRKELAND and C. STÖRMER. Relations to the ionosphere, solar emissions and magnetic storms are next discussed. "The accumulating

evidence is that every great aurora has its origin in an intense flare" through a corpuscular stream. Auroral spectra and the processes which produce them are described. The more recent theories of aurora are based on a neutral solar stream of ions and electrons, but the mechanism is still obscure. Additional exact observations are needed and are in progress; they will be intensified during the International Geophysical Year. (*Same item as 8.2-322, Met. Abstracts.*) *Subject Headings:* 1. Auroras 2. Auroral-solar relationships.—C.E.P.B.

12B-143

551.521.67:551.594.51:550.385.4

Petukhov, V. A. (*Geophysical Inst., Academy of Sciences, Moscow*), **Solar neutron ejection as the cause of aurorae and magnetic storms.** (In: *The airglow and the aurorae: a symposium.* London, Pergamon, 1956. p. 254-261. table, 11 refs., 3 eqs.) **DWB**—It is suggested that the incoming stream causing auroras and magnetic storms consist initially of neutrons ejected from the sun, the neutrons decaying into protons and electrons during their passage to the earth. The consequences of the suggestion are discussed in detail. (*Same item as 8.8-311, Met. Abstracts.*) *Subject Headings:* 1. Solar neutrons 2. Auroral particles 3. Magnetic storms.—*Author's abstract.*

12B-144

551.594.51:535.33

Pillow, M. E., **Intensity distribution among nitrogen bands in the auroral spectrum.** *Royal Society of London, Proceedings, Ser. A*, 67(9):780-788, Sept. 1, 1954. 4 figs., 6 tables, 11 refs. **DWB**—The factor $p = [\int \int \psi_v \psi_v dr]^2$, occurring in transition probabilities between vibrational levels, has been calculated for a number of transitions of nitrogen molecules. Intensities obtained from these values have been used to investigate the distribution of intensities among bands in auroral spectra. (*Same item as 6.3-374, Met. Abstracts.*) *Subject Heading:* 1. Auroral spectra.—*Author's abstract.*

12B-145

551.501.81:551.594.5

*Presnell, R. I.; Leadabrand, R. L.; Peterson, A. M. et al. (*all, Stanford Res. Inst., Menlo Park, Calif.*), **VHF and UHF radar observations of the aurora at College, Alaska.** *Journal of Geophysical Research*, Wash., D. C., 64(9):1179-1190, Sept. 1959. 13 figs., 6 tables, 14 refs. **DLC**—During routine UHF auroral radar investigations an unusual daytime auroral effect has been discovered. It apparently occurs most frequently when: (1) the reflecting region is sunlit; (2) the atmosphere is undergoing its greatest change (early morning and late afternoon). There is a minimum of echo occurrence at noon when atmospheric conditions are stable. Daytime aurora is distributed over a larger region of space than the more commonly observed nighttime aurora. The nighttime and daytime echoes are labeled discrete and diffuse, respectively. They can be differentiated in several ways. Discrete echoes are identified by their relatively short duration, their occurrence only at night, and their orientation in the E layer along a plane at right angles to radar beam; hence, the echo does not shift in range with change in elevation angle of the radar antenna. Diffuse echoes last longer, occur only during the day, and are apparently oriented in the E layer along a plane almost parallel to the surface of the earth; hence, the echo does shift in range when the radar-antenna elevation angle is changed. The primary effects of increasing the observation frequency are decreasing echo amplitudes and decreasing maximum off-perpendicular angle. The observed aspect sensitivity and the wave length dependence are interpreted in terms of the scattering approach of BOOKER. Using the experimental UHF results, a model of the underdense ionosphere has been developed consisting of irregularities which have dimensions of 0.1 m across and 3.5 m along the magnetic field lines. The echo results are compared with auroral zone effects and described, together with measurements of the frequency spectra (Doppler shift and spread) of an aurorally reflected continuous-wave signal. (*Same item as 11H-119, Met. Abstracts.*) *Subject Headings:* 1. Radar observation of auroras 2. Daylight auroras. I. Dyce, R. B. II. Schlobohm, J. C. III. Berg, M. R.—*Authors' abstract.*

12B-146

551.594.51

Reid, G. C. (*Geophysical Inst., Univ. of Alaska*), **Electric field theory of aurorae.** *Nature*, London, 182(4652):1791-1792, Dec. 27, 1958. fig., 2 eqs., 4 refs. **DWB**—A qualitative description of the development of a typical auroral display as a result of the growth of an electric field in the ionosphere is presented. *Subject Headings:* 1. Electric field theory of auroras 2. Auroral theories.—N.N.

12B-147

551.590.21:551.594.51

Roberts, Walter Orr, **Corpuscles from the sun.** *Scientific American*, 192(2):40-45, Feb. 1955. figs., photos. **DLC**—The author traces the history of our knowledge of sunspots and streams of solar particles which cause auroras and magnetic disturbances when they reach the earth's atmosphere. His own theories are formulated and depicted in a schematic model or diagram. The first hint of the effect of solar flares was noted by RICHARD C. CARRINGTON, in England on Sept. 1, 1859.

The Chapman-Ferraro and Alfvén theories are contrasted. (*Same item as 6.9-317, Met. Abstracts.*)
Subject Headings: 1. Corpuscular theory 2. Auroral theories.—M.R.

12B-148

551.594.51:546.17

†Roesler, F. L.; Fan, C. Y. and Chamberlain, J. W. (*all, Yerkes Obs., Williams Bay, Wisc.*), Interpretation of rotational temperatures of auroral N_2^+ bands, Pt. 1, Proton impact at intermediate energies. *Journal of Atmospheric and Terrestrial Physics*, London, 12(2/3):200-205, 1958. 2 figs., 20 refs., eq. **DLC**—Laboratory experiments have been performed to find the rotational temperature of the first negative bands of N_2^+ when nitrogen is excited by proton collisions at energies between 10 and 30 keV. In this range there is little difference between the gas temperatures and the apparent (rotational) temperatures obtained by proton excitation. The question of the correspondence between auroral N_2^+ temperatures and the gas temperatures in the high atmosphere is reviewed. In spite of the agreement reported here, the matter is still definitely settled. For a confident interpretation of auroral N_2^+ band structure, further experimental work is required. (*Same item as 10.2-342, Met. Abstracts.*) *Subject Headings: 1. Rotational temperatures 2. Auroral nitrogen bands 3. Auroral zone temperatures.—Authors' abstract.*

12B-149

551.594.52:550.385

Romick, G. J. and Elvey, C. T. (*both, Geophysical Inst., Alaska Univ. College*), Variations in the intensity of the hydrogen emission line $H\beta$ during auroral activity. *Journal of Atmospheric and Terrestrial Physics*, London, 12(4):283-287, 1958. 2 figs. (incl. photo), 7 refs. **DLC**—Through the qualitative analysis of the auroral spectrum incident from the magnetic zenith, the variation of the estimated intensity with time has been obtained for $H\beta$ (4863 Å) and the 4709 Å line of N_2^+ . The results show that the peak in intensity of $H\beta$ precedes that of the 4709 Å line by 1-4 hr, and that the period in which the intensity of $H\beta$ peaks occurs when quiet forms of the aurora are present. This same period is associated with low amplitude low frequency fluctuations of N-S earth potential. The overall earth potential fluctuation is highly correlated with the intensity variations of the 4709 Å line of N_2^+ and with the type of aurora present at the zenith. (*Same item as 10.6-327, Met. Abstracts.*) *Subject Headings: 1. Auroral intensity variations 2. Auroral-geomagnetic relationships.—Authors' abstract.*

12B-150

551.510.62:551.521.1:551.594.5

Scientists upset theories about particles in space. The Evening Star, Wash., D. C., A-11, June 11, 1957.—Radio propagation experiments indicate that the "ghost signals" arriving about $\frac{3}{4}$ sec later, come from space up to 6000 mi. The findings of ROBERT A. HELIWEILL and his associate ERNST GEHRELS [both of Stanford Univ.] contradict current theories on magnetic storms, aurora borealis, and deepen the problems of solar activity as influencing weather. Outer space may be utilized for radio communication. *Subject Headings: 1. Radio reflections from space 2. Auroral theories 3. Solar-weather relationships.—W.N.*

12B-151

551.594.51

*†Seaton, M. J. (*Univ. College, London*), Excitation processes in the aurora and airglow, Pt. 1, Absolute intensities, relative ultra-violet intensities and electron densities in high latitude aurorae. *Journal of Atmospheric and Terrestrial Physics*, London, 4(6):285-294, 1954. 2 figs., 3 tables, refs., p. 293-294, 4 eqs. Also: Pt. 2, Excitation of forbidden atomic lines in high latitude aurorae. *Ibid.*, p. 295-313. fig., 9 tables, 32 eqs. Also: Pt. 3, Low-latitude aurorae. (In: The airglow and the aurorae: a symposium. London, Pergamon, 1956. p. 225-243. 2 figs., 9 tables, 45 refs., 17 eqs.) Also: Pt. 4, On the excitation of permitted OI lines in high-latitude aurorae. *Ibid.*, p. 244-248. table, 15 refs., eqs. **DWB**—Pt. 1 discusses certain auroral observations and seeks to obtain information in a form which is best suited to the study of physical processes. An attempt is made to express largely descriptive information on the auroral brightness in terms of a quantity $\pi(5577)$, the number of oxygen green line quanta emitted, in the line of sight, per cm^2 column per second. It is concluded that International Brightness Coefficients I, II, III and IV correspond to $\pi(5577)$ being approximately equal to 2×10^9 , 1×10^{10} , 1×10^{11} and $5 \times 10^{12} \text{ cm}^{-2} \text{ sec}^{-1}$. Measured ultra-violet vibration band intensities are compared with those obtained from theoretical and laboratory studies. Error in auroral intensities is adjusted with a correction curve. Radio and optical evidence on electron density is discussed and it is concluded that electron densities between 10^7 and 10^8 cm^{-3} occur in bright high latitude aurorae. Pt. 2 gives a summary of the various excitation and deactivation processes which may occur, and an attempt is made to decide which of these will be of major importance. Relative intensities of the [OI] lines ($\lambda 5577$ and $6300+6364$) show that deactivation must occur. Various deactivation processes involving collisions with gas molecules are discussed. Although none of these appear to be particularly promising, there are several processes which may contribute. The forbidden line emission rate resulting from $N_2^+ + e \rightarrow N' + N''$ is estimated and found to be in good agreement with observation. Proposed identifications with [NII], [OII]

and [OIII] lines are discussed. Pt. 3 is concerned with the type of world-wide activity observed on rare occasions at geomagnetic latitudes as low as 20–30°. Using the aurora of Sept. 18–19, 1941 as a reference, the report discusses low-latitude spectral characteristics, density of spectral elements, currents (order of magnitude and density), etc. Pt. 4 discusses excitation mechanisms for the [OI] lines $3p^2P \rightarrow 3s^2S$, $\lambda 7774$ and $3p^2P \rightarrow 3s^2S$, $\lambda 8446$. The hypothesis is examined that $3p^2P$ is excited by collisions between electrons and ground-state oxygen atoms. The discussion concludes that the hypothesis of electron excitation is improbable. (Same items as 8.3–340 (Pts. 1 and 2), 9.1–287 (Pt. 3) and 9.1–288 (Pt. 4), *Met. Abstracts*.) *Subject Headings:* 1. Auroral energy excitation mechanisms 2. Low-latitude auroras 3. High-latitude auroras.—*From author's abstracts.*

12B-152

551.594.51

Seaton, M. J. (*Inst. d'Astrophysique, Paris*), The calculation of cross-sections for excitation of forbidden atomic lines by electron impact. (In: *The airglow and the aurorae: a symposium*. London, Pergamon, 1956. p. 289–301. figs., 6 tables, 12 refs., 30 eqs.) DWB—The paper outlines the methods used, summarizes the results obtained, and discusses their probable accuracy. (Same item as 8.8–312, *Met. Abstracts*.) *Subject Heading:* 1. Auroral energy excitation mechanisms.—*Author's abstract.*

12B-153

551.594.51:551.524.7

Shepherd, G. G. and Hunten, D. M., Variation of rotational temperature with height in the aurora. Saskatchewan. Univ. Physics Dept., Contract AF 19(122)-152, Scientific Report, No. AR-11, [1954?]. 22 p. 4 figs., 4 tables, 15 refs. DWB—A considerable number of auroral spectra of the negative group band N_2^+ (00) at 3914 Å have been obtained with a scanning spectrometer. For some of these spectra, auroral heights were determined by means of double station photography. Rotational temperatures were measured from the band profiles by the usual method which is described. The results indicate an increasing rotational temperature with height through the lower auroral region. This is in qualitative agreement with the accepted kinetic temperature variation in that region. (Same item as 6.10–292, *Met. Abstracts*.) *Subject Headings:* 1. Auroral spectra 2. Auroral spectrometers 3. Rotational temperatures of auroras.—*Authors' abstract.*

12B-154

551.594.5:535.33

Shuiskaya, F. K., O spektrakh poliarnykh siiani. [Auroral spectra.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofizich.*, No. 3:510–512, March 1960. fig., 3 tables, 9 refs. DLC. Transl. into English in the corresponding number of the *Akademiia Nauk SSSR, Bulletin of the Academy of Sciences, USSR, Geophysics Series*.—The latitudinal variations in the relative intensities of oscillating zones of 2PG N_2 in polar auroras are examined. The apparatus and method of making observations are described and data are presented on the values of relative probabilities of transition between oscillating levels of two electron conditions 2PG N_2 and relative population of upper oscillating levels 2PG N_2 $g(v')$ ($v'=0; 1; 2$) and the ratio of intensities of oscillating zones 2PG N_2 . It is concluded that the populations of upper oscillating levels of N_2 in the typical high latitude auroras are higher than the populations for low latitude auroras. The latter coincide with magnitudes $g(v')$ for the high altitude red aurora of type A with intense atomic lines. The value T_{fluct} for typical high latitude auroras is higher than T_{fluct} for low latitude auroras. In lower altitude yellow-white forms characteristic of auroras of high latitude the disturbances 2PG N_2 are higher than in red (type A) high latitude and low latitude auroras. *Subject Headings:* 1. Auroral spectra 2. Auroral intensity distribution.—*I.L.D., ©*

12B-155

551.594.51:535.33

Shuiskaya, F. K. (*Inst. of Atmospheric Physics, Academy of Sciences, USSR*), Determination of the Balmer decrement in auroral spectra. *Soviet Astronomy AJ*, New York, 4(1):178–179, July/Aug. 1960. 2 refs. DLC. Transl. of original Russian in *Astronomicheskii Zhurnal*, Moscow, 37(1):186–187, Jan./Feb. 1960. DLC—Hydrogen lines H_α , H_β , and H_γ were photographed in three auroral displays (dispersion 250 Å/mm). The mean value of the decrement $H_\alpha:H_\beta:H_\gamma$ was 3.0:1:0.8. *Subject Heading:* 1. Auroral hydrogen lines.—*Author's abstract.*

12B-156

551.594.51:551.521.9

Singer, S. F., Thermonuclear processes in the aurora. Maryland. Univ. Physics Dept., Contract AF 18(600)-1038, Technical Report, No. 52, August 1956. 11 p. 3 figs., 4 tables, 16 refs., 7 eqs. DWB—The suggestion is made, and the consequences elaborated upon, that γ radiation occurring during auroras could result in rare but important thermonuclear reactions, which would allow high energy radiations to penetrate much lower in the atmosphere than the 80–100 km lower limit of the aurora itself. One half of the energy produced by these reactions would penetrate downward and have geochemical consequences. The nuclear effects would be important in the

design of the outer skin of space vehicles. Study of the nuclear processes involved can also contribute to knowledge of the aurora itself. (*Same item as 9.8 285, Met. Abstracts.*) *Subject Headings:* 1. Nuclear reactions in auroras 2. Auroral radiations 3. Satellite design.—*M.R.*

12B-157

551.594.5:550.385.4

†Singer, S. Fred (*Dept. of Physics, Maryland Univ.*), **A new model of magnetic storms and aurorae.** *American Geophysical Union, Transactions*, 38(2):175-190, April 1957. 14 figs., 3 tables, 30 refs., eqs. **DWB, DLC.** Also issued as Maryland Univ. Physics Dept., Contract AF 18(600)-1038, Technical Report No. 48, July 1956. 20 p. 14 figs., 3 tables in appendices. **DWB**—A new model for explaining S.C.'s (sudden commencements), magnetic storms and the aurora is developed and presented in a lucid manner. Other models are reviewed (**CHAPMAN, FERRARO and ALFVÉN**), observational evidence discussed and the pre-S.C. bays attributed to high-velocity particles preceding the shock waves following 22-34 hrs after a solar eruption. The shock wave is retarded by the geomagnetic field, but accelerates as it enters the auroral zone and produces polar S.C.'s. The decrease in the storm is due to high-velocity particles following up to 9 hrs after the shock wave. The shock wave may help accelerate auroral particles. (*Same item as 9.4-278, Met. Abstracts.*) *Subject Headings:* 1. Sudden commencements 2. Magnetic storms 3. Magnetic storms and auroras.—*M.R.*

12B-158

551.521.67:551.510.536:551.594.5:550.38

Singer, S. Fred (*Univ. of Maryland, College Park, Md.*), **Geophysical effects of solar corpuscular radiation.** *Journal of Atmospheric and Terrestrial Physics*, London, 15(1/2):48-50, Sept. 1960. 16 refs. **DLC**—Magnetic storms, auroras and cosmic rays as effects of emission of solar gas of high velocity are explained in terms of a model of interplanetary space and of the outer ionosphere of the earth. A three-dimensional model evidences the sudden commencement, SC, and the reverse SC as two types of magnetic storm effects by currents flowing from the ionosphere to the magnetic field of the earth. The acceleration of solar corpuscles to auroral energies is believed taking place close to the earth by a type of betatron effect. The Forbush decreases of cosmic rays are explained as a deceleration by electric fields. Several observations are proposed to test crucial features of theories of magnetic storms and aurora. *Subject Headings:* 1. Solar corpuscular influences on upper atmosphere 2. Solar-geomagnetic relationships 3. Solar effects on auroras.—*O.T., ©*

12B-159

551.594.51:546.17

Stewart, D. T. (*Queen's Univ., Belfast*), **Electron excitation functions of N_2^+ bands.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, 1956. p. 282-286. 2 figs. (incl. photo), ref., eqs.) **DWB**—The optical excitation functions of some N_2^+ bands have been determined. The maximum of intensity of the Meinel bands ($A^2I\Gamma - X^2\Sigma_g^+$) occurs at 60 V, while that of the first negative bands ($B^2\Sigma_u^+ - X^2\Sigma_g^+$) occurs at 95 V. (*Same item as 8.8-313, Met. Abstracts.*) *Subject Headings:* 1. Auroral nitrogen bands.—*Author's abstract.*

12B-160

551.594.51:546.17

Nicholls, R. W., **Intensity measurements of molecular spectra. Pt. 1, Spectroscopic intensities and photographic blackening.** London, Ontario. University of Western Ontario. Dept. of Physics, Contract AF 19(122)-470, Scientific Report, No. 1, Oct. 22, 1952. 16 p. 3 figs., 2 tables, 6 refs., 13 eqs. Also: **Pt. 2, An experimental study of band intensities in the first positive system of N_2 .** *Ibid.*, Scientific Report, No. 14, April 10, 1954. 26 p. 3 figs., 7 tables, 13 refs., 4 eqs. **DWB**—Pt. 1: A method is described which allows meaningful information pertaining to source condition to be derived directly from microdensitometer traces of spectra of the source in question. It is not intended to supplant the unquestioned superior, though more laborious, method of photographic photometry normally required before photographic spectra can be interpreted from an intensity standpoint. Rather it is proposed as a useful survey method that can be applied relatively rapidly to plates taken from various source conditions. In addition to the density measurements, the method also requires some knowledge of the fractional transition probabilities involved in the transition, which for bands of auroral interest are becoming available. In Pt. 2, integrated intensities of 52 bands of the N_2 first positive system have been measured using a recording infrared spectrometer. These data have been interpreted as vibrational transition probabilities which were compared with theoretical values calculated under the assumption that the electronic transition moment is independent of internuclear separation. The comparison shows that the assumption is not valid for this electronic transition. The experimental band intensities have been used together with the theoretical transition probabilities to determine the dependence of the electronic transition moment upon internuclear separation. (Pt. 1: *Same item as 4.7-225*; Pt. 2: *Same item as 7.5-254, Met. Abstracts.*) *Subject Headings:* 1. Auroral physics 2. Infrared spectroscopy 3. Nitrogen spectra.—*Authors' abstract.*

12B-161

551.594.51:551.594.12

Unwin, R. S. (*I. G. Y. Station of Dominion Physical Lab., Dept. of Sci. and Indus. Res., New Zealand*), **The geometry of auroral ionization.** *Journal of Geophysical Research*, Wash., D. C., 63(3):501-506, Sept. 1958. 5 figs., 7 refs. **DLC**—New evidence is presented which shows that VHF radio echoes from auroral ionization are reflections from aspect-sensitive columns aligned with the earth's magnetic field. Previous experimental data, interpreted in terms of a distribution of ionization along a line of magnetic latitude, are shown to be consistent with this hypothesis. (*Same item as 10.5-343, Met. Abstracts.*) **Subject Heading: 1. Auroral ionization.—Author's abstract.**

12B-162

551.501:551.594.5:551.506.22(485)

* [Uppsala. Universitet. Ionosphere Observatory], **Visuella norrskenobservationer i Sverige.** [Visual observations of the aurora borealis in Sweden.] Manuscript [about 1956]. Transl. into English by Valda Dreimanis, issued by American Meteorological Society under Contract AF 19(604)-1936, Aug. 1957. 7 p. Typescript.—A set of instructions for the volunteer observers of the aurora borealis in connection with the third International Geophysical Year. These instructions contain general information on the aurora borealis and what should be observed and recorded. Some suggestions concerning the setting up of simple observational facilities are also included. **Subject Headings: 1. Visual observation of auroras 2. Auroral observation techniques 3. IGY auroral program 4. Swedish participation in IGY 5. Sweden.—I.S.**

12B-163

551.521.326:551.594.51

Vassy, Arlette and Vassy, Étienne, **Altitude of the layer emitting the night-sky light.** (In: International Conference on the Emission Spectra of the Night Sky and Aurorae, London, 1947, **Papers.** pub. 1948. p. 53-59. 2 figs., 2 refs.) Also: Vassy, Arlette; Abadie, Paul and Vassy, Étienne, **L'altitude des couches émettant la lumière du ciel nocturne dans les régions tropicales et sa variation au cours de la nuit.** [The altitude of the layers emitting the light of the night sky in tropical regions, and its variation during the course of the night.] *Académie des Sciences, Paris, Comptes Rendus*, 228(7):592-593, Feb. 14, 1949. **DWB**—Based on measurements made at the Pic du Midi Observatory (2850 m) in 1943, 1945 and 1946, beginning 2 or 3 hrs after sunset. Methods of recording are described in detail. Theoretical curves are shown for 25 to 1200 km height and compared with observed curves of intensity I/I_0 against air mass m ; the latter curves fall into two groups, the higher intensity group which varies rapidly being attributed to auroral activity and the lower more stable one to ordinary or permanent night sky light. Not enough diffusion is evident to account for emission from a single layer; emitting layers are not uniformly distributed around earth; height of green line layers are 1000 km and 75-100 km, and red line layers at 750 km and 100 km respectively. The second paper (*same item as 2-181, Feb. 1950, MAB*) is a continuation of observations made on the Pic du Midi. In addition, observations made at Tamanrasset are included. (*Same item as 8B-36, Met. Abstracts.*) **Subject Headings: 1. Night airglow 2. Emission layer heights 3. Auroral emission 4. Night airglow intensities 5. Pic du Midi Observatory, France 6. Tamanrasset, Algeria.—M.R.**

12B-164

551.594.5

Vassy, Etienne (*Prof. Faculty of Science, Paris*), **Physique de l'atmosphère, Tome I.** [Physics of the atmosphere, Vol. 1.] Paris, Gauthier-Villars, 1956. Ch. 1, **Les aurores polaires.** [Ch. 1, Polar auroras.] pp. 61-167. 75 figs., 9 tables, eqs. **DLC** (QC880.V3)—The chapter on auroras occupies a major portion of this excellent text, giving perhaps the most complete survey of existing knowledge in this field. The material is treated in five sections. In Sec. A descriptive phenomena, such as auroral forms, brightness, color, distribution in space and time, etc., are discussed, and relations to solar activity and atmospheric tides are considered. Sec. B contains a detailed summary of the results of auroral spectroscopy. Sec. C deals with radio emission and reflection from auroras. Sec. D is a review of various auroral theories, namely, the theory of corpuscular radiation of atmospheric origin, theories of BIRKELAND, STÖRMER, DAUVILLIER, CHAPMAN-FERRARO, ALFVÉN, and others. Finally, in Sec. E, applications of results of auroral research to investigations of upper atmospheric composition, temperature, density and pressure are described. The chapter is illustrated throughout with representative data obtained by various authors. **Subject Headings: 1. Auroras 2. Auroral theories.—G.T.**

12B-165

551.510.535:551.594.51:535.33

†Vegard, Lars, **Continued investigations on the auroral luminescence and the upper atmosphere.** *Geofysiske Publikasjoner*, Oslo, 12(14), 1940. 23 + p. 4 figs., 11 tables, 34 refs., 24 eqs. **DLC**—Results of spectroscopic auroral observations made at Tromsø in 1938 are tabulated and discussed. The chapter on the interpretation of observed latitude and altitude effects (p. 8-10) includes consideration of dissociation, recombination and ionization processes in the upper atmosphere under

the influence of solar radiation of the soft X-ray type. (*Same item as 6E-185, Met. Abstracts.*)
Subject Headings: 1. Auroral spectroscopy 2. Atmospheric composition 3. Tromsø, Norway.—G.T.

12B-166

551.510.3:535.33 551.521.326:551.594.5:535.33

Vegard, Lars, *Spectroscopy of the higher atmosphere*. *Physica*, The Hague, 12(9/10):606-614, Dec. 1946. refs. **DLC**—A list is given of the emission lines and bands that have been observed in the night sky spectrum with the spectrographs at the different auroral observing stations in northern Norway. In addition to the forbidden lines of OI and OIII there are many other lines due to OII indicating that a considerable fraction of the O in the auroral region of the atmosphere exists in the form of singly ionized atoms. The appearance of strong bands of N and the absence of O bands indicates that dissociation is much greater for O than for N, thus accounting for the weakness of the lines of atomic N. Occasionally lines of the Balmer series of H are observed; and fluctuations are noted in the intensity of the D lines of Na in high auroral streamers after the sun's ultraviolet light is screened off by the earth's shadow. These facts indicate that at times showers of H and Na, of cosmic origin, fall into the auroral region. (*Same item as 6E-186, Met. Abstracts.*) *Subject Headings:* 1. Auroral spectra 2. Oxygen dissociation 3. Nitrogen dissociation 4. Atmospheric composition 5. Norway.—*Chemical Abstracts*, No. 5017/a, 1947.

12B-167

551.510.535:551.594.51:551.521.326

Vegard, Lars, *Report on recent work on ionospheric phenomena and on solar and terrestrial relationship*. (In: International Conference on the Emission Spectra of the Night Sky and Aurorae, London, 1947, *Papers*. pub. 1948. p. 82-91. 3 refs.) **DWB**—A summary of many separate investigations reported in papers published by the author since 1940 in *Geofysiske Publikasjoner* (see 12B-165). The problems discussed are: 1) detection and interpretation of new lines in auroral spectrum; 2) wave length and relative intensity of the weak component of the red [OI] doublet; 3) variability of intensity distribution within the auroral spectrum; 4) determination of ionospheric temperature from auroras at different altitudes and in sunlight; 5) origin and excitation of sodium line in twilight; 6) coronal phenomena and their relation to solar and terrestrial processes; 7) probability of an O atom losing its excitation energy through collisions. It is suggested that the sodium enters the atmosphere from the sun. (*Same item as 3.9-89 and 8B-38, Met. Abstracts.*) *Subject Headings:* 1. Auroral physics research 2. Night airglow 3. Auroral spectra 4. Ionospheric temperatures 5. Coronal phenomena 6. Earth's corona. I. Kvitte, G. II. Tönsberg, E.—M.R.

12B-168

551.510.535:551.594.5

Vegard, Lars, *The Doppler displacement of the ionospheric hydrogen lines and its bearing on the auroral theory and solar terrestrial relationships*. *International Council of Scientific Unions. Mixed Commission on the Ionosphere, Third meeting, Canberra, Australia, Aug. 24-26, 1952, Proceedings*, pub. 1953. p. 135-144. 2 tables, 18 refs., 5 eqs. **DWB**—The author recapitulates his auroral theory and theory of its agreement with auroral H-line observations. The theory interprets auroral phenomena in terms of the ratio of electrons to protons in bundles of solar corpuscular radiation reaching the ionosphere. Detection of new auroral bands at Tromsø is mentioned, bringing the total of auroral bands and lines measured to approximately 520. (*Same item as 6.8-191, Met. Abstracts.*) *Subject Headings:* 1. Auroral theories 2. Ionospheric hydrogen lines 3. Corpuscular radiation 4. Auroral hydrogen lines.—G.T.

12B-169

551.594.51:546.11

†Vegard, Lars and Kvitte, G., *Theory and observations of the enhancement of auroral hydrogen lines with increasing distance from the magnetic axis point*. *Geofysiske Publikasjoner*, Oslo, 19(2), 1954. 10 p. 5 tables, plate, 26 refs. **DWB, DLC**—Twenty-six spectrograms are shown. The intensity of the H β line at Oslo is more than 6 times greater than at Tromsø. The increase of magnetic stiffness with increasing proton velocity might be a cause of this effect. The new results are in some disagreement with the classical Birkeland-Störmer theory. (*Same item as 7.10-300, Met. Abstracts.*) *Subject Headings:* 1. Auroral hydrogen lines 2. Birkeland-Störmer theory 3. Oslo, Norway 4. Tromsø, Norway.—A.A.

12B-170

551.521.6:546.33

*Vegard, Lars; Kvitte, G.; Omholt, A. and Larsen, S., *Studies of the twilight sodium lines from observations at Oslo and Tromsø, and results of auroral spectrograms from Oslo*. *Geofysiske Publikasjoner*, Oslo, 19(3), 1955. 21 p. 4 figs., 6 plates, 9 tables. **DLC, DWB**—VEGARD'S twilight method for the determination of the screening height (H_s), the upper height of the intense sodium layer (H_u) and the thickness of the sodium layer (ΔH_u) is discussed, answering recent criticism of his approach. The screening height is probably determined by absorption of ultraviolet radiation in the ozone layer. New observational results are published, giving as long-year averages $H_u=107$, $H_s=43$ and $\Delta H_u=28$ km at Oslo and $H_u=104$, $H_s=34$ at Tromsø, where auroras disturb measure-

ments. These heights do not have a seasonal variation but the intensity of the sodium light has a maximum in Dec. Some auroral spectrograms lead to the identification of several new bands or lines in the region 7100 to 8795 Å. A working hypothesis, regarding the sodium D-line in twilight, is proposed in an appendix. (Same item as 7.4-13, *Met. Abstracts*.) *Subject Headings:* 1. Sodium lines 2. Twilight observations 3. Auroral spectrograms 4. Oslo, Norway 5. Tromsø, Norway.—A.A.

12B-171

551.594.5:551.521.67

†Vegard, Lars, *Intensity variations of auroral hydrogen lines and the influence of the solar proton radiation on the auroral luminescence*. *Geofysiske Publikasjoner*, Oslo, 19(4), 1955. 10 p. fig., 2 tables, 30 refs. **DLC, DWB**—The existence of protons in solar ray bundles, causing auroras, required by theory, was proved by observing broadened and displaced H_{β} lines. Electron velocity is much greater than the proton velocity in a bundle. Increase in proton velocity increases the polar distance of aurora. Relative intensity of H lines shows a pronounced latitude effect. This intensity increases also with altitude. Excitation with positive rays produces about 100° higher temperature than that of the surrounding gas. Proton excitation in red aurora is discussed. (Same item as 9.6-288, *Met. Abstracts*.) *Subject Headings:* 1. Auroral hydrogen lines 2. Solar proton radiation.—A.A.

12B-172

551.521.326:551.594.5

†*Vegard, Lars, *Composition, variations and excitation of auroral luminescence spectra*. *Geofysiske Publikasjoner*, Oslo, 19(9), 1956. 51 p. 13 figs., 4 plates, 18 tables, 71 refs. **DLC**—This monograph contains an elaborate analysis of auroral spectrograms obtained with a "V" and a "F" spectrograph at Tromsø Observatory during 1951/52 and 1952/53. Wave length and intensity measurements, groups of auroral features, verification of atomic line interpretation, auroral lines observed by other scientists, problems of analysis, band systems present, Doppler displacement and proton velocities and temperature measurements of "V" spectrographs; and latitude and altitude effects of proton flux (and of H-lines), spectrograms of pulsating and red auroras, correlation between intensity variations of Forbidden NI lines and proton flux and ionospheric temperature determinations by means of the N_2^+ IN bands, are discussed with data and spectrograms presented in profusion. (Same item as 8.10-24, *Met. Abstracts*.) *Subject Headings:* 1. Auroral luminescence spectra 2. Auroral F spectrograms 3. Auroral V spectrograms 4. Tromsø, Norway.—M.R.

12B-173

551.594.5:551.590.21

Vegard, Lars (*Physical Inst., Oslo Univ.*), *Phenomena caused by solar X-rays and properties of the solar electric ray bundles producing the aurorae*. (In: *Solar eclipses and the ionosphere: a symposium* . . . ed. by W. J. G. Beynon and G. M. Brown. London, Pergamon, 1956. p. 300-301. ref.) **DWB**—Brief account of the effects on the terrestrial atmosphere of solar electric ray bundles. Electron rays appear to dominate auroral production, while the proton-flux influences the spectral composition of auroral luminescence. Disturbances in the ionosphere produced by the ray bundles are considered. (Same item as 9.10-306, *Met. Abstracts*.) *Subject Headings:* 1. Solar electric ray bundles 2. Solar effects on auroras.—*Author's abstract*.

12B-174

551.594.5:551.521.67

†Vegard, Lars, *Recent progress relating to the study of aurorae and kindred phenomena*. *Geofysiske Publikasjoner*, Oslo, 20(4), Jan. 1958. 16 p. 2 figs. (incl. photo), 3 tables, 31 refs., 5 eqs. **DLC, DWB**—From auroral studies it was found that the structure of the ionosphere, the zodiacal light, the solar corona and the bundles of electric rays which produce auroras and most magnetic disturbances is due to the photoelectric effect of solar X-rays of various frequencies and different distributions. The electric bundles producing the auroras are formed by photoelectrons from the sunspot area and neutralized by positive ions, mainly protons. In the years 1939-41 it was found, by means of Doppler effect, that the bundles carried protons with velocities amounting to at least 2.10^8 cm/sec. The neutralized bundles led to an auroral theory essentially similar to the Birkeland-Störmer theory, but variation of the proton flux in the bundle led to many consequences which could be verified with spectral studies of the auroras. Thus variations with latitude and altitude were found in accordance with theory. From the fact that protons and electrons give essentially different spectra a number of variability effects could be explained. Thus the red auroras of type A and B were found to be due to protons and electrons, respectively. Recently detected enhancements of atomic lines were found to be due to increase in the relative proton flux. The velocity of protons is as a rule much smaller than that of the electrons. Consequently the bundle carries a surplus of negative electricity into the atmosphere where it produces electric and magnetic disturbances of various kinds, and gives the earth a negative charge. Temperature measurements from N_2^+ bands corresponding to altitudes of several hundred km gave no indication of any increase of temperature

with altitude. (Same item as 10.10-302, *Met. Abstracts*.) *Subject Headings*: 1. Auroral research
2. Solar X-rays.—*Author's abstract*.

12B-175

550.388.8:551.594.5

Vestine, E. H. and Sibley, W. L. (both, *Rand Corp. Santa Monica, Calif.*), **Remarks on auroral isochasms.** *Journal of Geophysical Research*, Wash., D. C., 64(9):1338-1339, Sept. 1959. fig., 10 refs., 2 eqs. **DLC**—Corresponding isochasms of the Northern and Southern Hemisphere are linked via geomagnetic field lines, though the mirror points do not always occur at auroral levels. Auroral particles usually move within and form a part of the outer Van Allen radiation belt. *Subject Headings*: 1. Isochasmic diagrams 2. Auroral-geomagnetic relationships 3. Geomagnetic field 4. Van Allen belts.—*E.Z.S.* ⑤

12B-176

551.594.52:551.501.5:550.388.8

†Vestine, E. H. and Sibley, W. L. (*Rand Corp., Santa Monica, Calif.*), **The geomagnetic field in space, ring currents, and auroral isochasms.** *Journal of Geophysical Research*, Wash., D. C., 65(7):1967-1979, July 1960. 9 figs., table, 28 refs., 10 eqs. **DLC**—Using a 48-coefficient spherical harmonic expansion of the geomagnetic field for 1955.0, the results of an analysis due to FINCH and LEATON, it is shown that geomagnetic field lines appear to interlink the northern and southern auroral zones. Theoretical average auroral isochasms are also estimated using an integral invariant for particle motion along the lines of force and between the Northern and Southern Hemispheres. Some conditions pertinent to simultaneity and similarity of the aurora borealis and the aurora australis are discussed. Though the auroral zones northern and southern shift in latitude with time, in accord with the intensity of magnetic disturbances, the average auroral zone remains a useful parameter in polar studies. The geographical distribution of isochasms appears to be successfully calculated from the geomagnetic field alone and an integral invariant of particle motion. The intersections of particular geomagnetic field lines with the earth's surface in the Northern and Southern Hemispheres, or conjugate points, are indicated. *Subject Headings*: 1. Isochasmic diagrams 2. Auroral-geomagnetic relationships.—*Authors' abstract*. ⑤

12B-177

551.594.5:550.385.37

†Vestine, E. H. (*Rand Corp., Santa Monica, Calif.*), **Note on the direction of high auroral arcs.** *Journal of Geophysical Research*, Wash., D. C., 65(10):3169-3178, Oct. 1960. fig., 3 tables, 39 refs., 2 eqs. **DLC**—The relationships between geomagnetic micropulsations in auroral luminosity are considered. Several features are found to be compatible with the concept of drainage of trapped radiation in the region of the outer Van Allen radiation belt in the western hemisphere. Certain homogeneous auroral arcs noted by STÖRMER at a height of 200 km in central Norway have a mirror point for trapped particles computed to be below ground level in the south Indian Ocean, a region likely to need surveys of the earth's main field. The magnetic-field gradients near the night-time electrojets near the northern and southern auroral zones will change the sign of drift of auroral particles, so that electrons spiraling up or down the geomagnetic-field lines may drift westward in some regions and eastward in others. The gradients of the transient electrojet fields may help to explain many of the complex features of auroral forms, when auroras are formed by incoming charged particles. *Subject Headings*: 1. Auroral arcs 2. Geomagnetic micropulsations 3. Auroral-geomagnetic relationships 4. Van Allen belts.—*Author's abstract*. ⑤

12B-178

551.594.51:535.33:546.17

Wallace, L. V. and Nicholls, R. W., **The interpretation of intensity distributions in the N_2 second positive and N_2^+ first negative band systems.** *Journal of Atmospheric and Terrestrial Physics*, 7(1/2):101-105, Aug. 1955. 5 tables, 12 refs., 6 eqs. **DWB**—Photoelectric band intensities of the N_2 second-positive and N_2^+ first-negative systems, are interpreted, with the aid of Franck-Condon factors $q(v'v'')$ and r -centroids $\bar{r}_{v'v''}$ to show the dependence of the electronic transition moment $R_e(r)$ of these systems upon internuclear separations. Smoothed arrays of vibrational transition probabilities have been derived for these band systems. (Same item as 7.11-351, *Met. Abstracts*.) *Subject Headings*: 1. Auroral physics research 2. Nitrogen bands.—*Authors' abstract*.

12B-179

551.594.51:535.33:546.211

†Wallace, L. and Chamberlain, J. W. (both, *Yerkes Obs., Univ. of Chicago, Williams Bay, Wisc.*), **Excitation of O_2 atmospheric bands in the aurora.** *Planetary and Space Science*, N. Y., 2(1):60-70, Oct. 1959. 3 figs., 2 tables, 26 refs., 13 eqs. **DWB**—Spectra of the aurora show a wide disparity between the rotational temperatures of the two observed atmospheric bands, $b^1\Sigma_g^+ \rightarrow X^3\Sigma_g^-$, with $T_{rot.}(0-1) \approx 200^\circ K$ and $T_{rot.}(1-1) > 700^\circ K$. As the rotational structure of the bands is not resolved, it is not absolutely certain that the temperature anomaly is real, but known features in the auroral spectrum would not produce the effect through blending. Fluorescence in the O—O band provides

a possible but improbable explanation. Another alternative to explain the data is excitation of O_2 by energy transfer from $O(^1D)$ (upper term of the red lines) followed by vibrational deactivation. In the latter case the relative intensities of the O_2 bands from vibrational levels $v \geq 1$, and predict virtually complete suppression of the (OI) red lines at 100 km in the airglow. The airglow O_2 emission gives $T_{rot}(0-1) = 183^\circ K$. (Same item as 11.10-187, *Met. Abstracts*.) *Subject Headings:* 1. Auroral temperatures 2. Oxygen bands 3. Airglow spectrum theories.—*Authors' abstract*.

12B-180

551.594.13:551.594.51

*†Wax, Nelson, *On the ring current hypothesis*. Göteborg, Sweden. Chalmers Tekniska Högskola, *Handlingar*, No. 171, 1956. 32 p. 7 figs., 4 tables, 27 refs., numerous eqs. **DLC**—A review of the basic facts and theories connected with magnetic storms, auroras and solar corpuscular streams, and recent empirical data is presented. The conclusion is that the existence of the Ring Current as hypothesized by STÖRMER, ALFVÉN, CHAPMAN-FERRARO, MARTYN and by many others, is not certain, and that the theory has several weaknesses when it comes to explaining some of the observed phenomena. On the other hand its existence cannot be disproved. *Subject Headings:* 1. Auroral theories 2. Ring currents.—*M.R.*

12B-181

551.594.5:551.510.535

†Weaver, J. T. and Skinner, R., *A theory of ionospheric currents associated with aurorae*, Pt. 1-2. *Canadian Journal of Physics*, Ottawa, 38(8):1089-1113, Aug. 1960. 6 figs., 35 refs., 93 eqs. **DWB, DLC**—The current distributions induced by dynamo action in a sheet of partially ionized gas moving with uniform velocity across a perpendicular magnetic field are derived for the case when the gas contains an elliptical region of greater ionization density. Special attention is paid to processes occurring away from the ends of a long narrow ellipse in which the ionization density is much greater than the surrounding region. The results are discussed in relationship to conditions pertaining in the ionosphere when a long homogeneous auroral arc is present. It is concluded that a line current, whose magnitude is linearly dependent on the height-integrated Cowling conductivity within the arc, flows along the arc. The average ionospheric current flowing along a long homogeneous arc, is calculated numerically on the basis of the theory developed in Pt. I. This is compared with the auroral current necessary to produce the observed magnetic disturbance at Saskatoon (51.1°N, 106.6°W) and Flin Flon (54.7°N, 102.0°W) for an arc which satisfied the conditions required by the theory. A good order of magnitude agreement between the two values is obtained. The theory also shows that, in general, the magnitude of the line current is proportional to the intensity of the arc, but that when the ionospheric wind is directed along the arc, the line current vanishes. Thus a simple explanation of the occurrence of arcs with no associated magnetic disturbance is provided. A relationship between the average magnetic disturbance due to arcs and the ionospheric wind velocity is also established. The hourly variation of magnetic disturbance during aurorally active hours at Saskatoon and Flin Flon is shown to predict ionospheric wind velocity variations which agree well with those obtained by radio measurements. *Subject Headings:* 1. Ionospheric currents 2. Auroral-ionospheric relationships.—*Authors' abstract*. ©

12B-182

551.510.535:525.75

551.594.51

551.521.326

Wu, Ta-you, *Excitation processes in the night sky and aurora*. *Indian Academy of Science, Bangalore, Proceedings*, Ser. A, 18(1):40, 66, July 1943. 2 figs., 2 tables, refs., 19 eqs. **DLC**—The emission spectra of the night sky and aurora, and especially the intensity distributions and diurnal variations, are explained on the view that all the excitation and quenching processes in the upper atmosphere are collisions of the second kind between metastable atoms and molecules of N_2 and O_2 . Photodissociation of molecules during the day forms normal atoms which recombine to form metastable molecules whose collisions produce the metastable atoms. The max. energy available in these latter is only 6.1 eV, so that the atomic lines of N, O, H and the rare gases are not excited. (Same item as 6E-36, *Met. Abstracts*.) *Subject Headings:* 1. Photochemistry of upper atmosphere 2. Excitation mechanisms 3. Night airglow theories 4. Auroral theories.—*Physics Abstracts*, No. 753, 1944.

SUPPLEMENTARY MATERIAL

12B-183

551.524.7:551.510.535:621:396.8

Dowden, R. L. (*Ionospheric Prediction Service, Hobart, Tasmania*), *Ionospheric thermal radiation at radio-frequencies in the auroral zone*. *Journal of Atmospheric and Terrestrial Physics*, N. Y., 18(1):8-19, April 1960. 6 figs., 2 tables, 11 refs. **DLC**—Measurements of the temperature of the ionospheric D region in the auroral zone from observations of 2 Mc/s radio noise are described and compared with measurements similarly made in the temperate region. The temperatures of the undisturbed and disturbed ionospheres at the two latitudes are found to be essentially similar, but

the disturbing influence in the auroral zone is probably corpuscular rather than ultra-violet radiation. (Same item as 11.10-324, *Met. Abstracts*.) *Subject Headings*: 1. Ionospheric temperatures 2. D region 3. Radio noise from ionosphere.—*Author's abstract*.

12B-184

551.594.5:627.396.8:621.396.8

Fleischer, R. (*Rensselaer Polytechnic Institute, Troy, N. Y.*), **Auroral absorption of 18-Mc/s cosmic radio waves on Feb. 11, 1958.** *Nature*, London, 181(4616):1156, April 19, 1958. fig. DWB—This preliminary report illustrates graphically the appearance of the spectacular auroral display observed widely in the United States on the night of Feb. 11, 1958. Observation of its effect on the 18 Mc/s cosmic noise from the sky was made at the Sampson Station (lat. 42°47'N, long. 73°27'W). A description of the method of obtaining such sudden absorptions of cosmic noise is recorded briefly in the *Astron. Journ.*, 62:243, 1957. *Subject Headings*: 1. Auroral descriptions 2. Auroral absorption of cosmic radio waves 3. Radio noise.—*N.N.*

PART III. TRANSLATION AND ANALYTICS FROM SERIALS AND COLLECTED WORKS

Note: Material listed in these sections will not be included in the monthly indexes until abstracted. The item number is mentioned for those titles which have been abstracted in previous issues of *Meteorological and Geostrophysical Abstracts*.

A. TRANSLATIONS OF IMPORTANT METEOROLOGICAL AND GEOASTROPHYSICAL MATERIAL

Akademiia Nauk SSSR, Bulletin [of the] Academy of Sciences, USSR, Geophysics Series
No. 8, Aug. 1959 (issued July 1960 by American Geophysical Union)

- Epina't'eva, A. M.: Interfering multiple-reflected waves, p. 779-787
Pod'iapol'skii, G. S.: Propagation of elastic waves in a layered medium, p. 788-793
Nikitin, V. N.: Recording of converted refracted $P_1S_2P_1$ waves for the purpose of computing the elastic constants of diabase covered by alluvium, p. 794-803
Shirokova, E. I.: Some facts on the character of the velocity change in the upper layers of the Earth's mantle, p. 804-813
Vvedenskaia, A. V. and Balakina, L. M.: Double refraction in the Earth's mantle, p. 814-817
Gzovskii, M. V.; Krestnikov, V. N. and Reisner, G. I.: Quantitative geological characterization of the mean gradient of the rate of vertical tectonic movements (dip changes) in the continental crust and some results of its application, p. 820-828
Krasovskii, V. I.; Shklovskii, I. S.; Gal'perin, Iu. I. et al.: Detection of 10-kev electrons in the upper atmosphere by the third Russian satellite, p. 829-832
Pletnev, V. D.: Penetration of fast charged particles from the outer atmosphere into the ionosphere, p. 833-834
Tsvang, L. R., and Komarov, N. N.: Study of light ion spectra in the free atmosphere, p. 835-844
Kachalov, V. P.; Pavlenko, N. A. and Iakovleva, A. V.: Ultraviolet solar spectrum in the 2636-2937 Å region, p. 844-848
Dikiĭ, L. A.: Acoustic and gravitational oscillations in the atmosphere, p. 849-853 (*For abstract on original Russian, see 11.5-268, May 1960, Met. Abstracts*)
Solov'ev, S. L. and Shebalin, N. V.: Tsunami and the intensity of Kuril-Kamchatka earthquakes, p. 854-857
Popov, G. I.: On the location of the epicenters of tsunamigenic earthquakes in the Far East, p. 858-860
Tikhonov, A. N.; Shakh-suvarov, D. N. and Rybakova, E. V.: Distinguishing of equivalent earth sections by means of alternating electromagnetic fields, p. 861-863 (*See 12.2-20, Feb. 1961*)
Briunelli, B. E.; Berdichevskii, M. N.; Alekseev, A. M. et al.: Observations of short-period variations in Earth's electromagnetic field, p. 864-871 (*See 11.12-304, Dec. 1960*)
Afanas'eva, V. I.: Short-period fluctuations of a geomagnetic field, p. 872-876 (*See 11.5-142, May 1960*)
Komarov, A. G.: Paleomagnetic investigations of Lower Paleozoic basalts of the Ukraine, p. 877-882
Kazinskii, V. A.: Calculation of the gravitational effects of local inhomogeneities in rocks, p. 883-885
Raspopov, O. M.: Vertical gradient of the force of gravity in mountainous regions, p. 886-888
Makhon'ko, K. P.: Size distribution of atmospheric dust particles, p. 889-891
Fedorov, K. N.: Coastal wind currents and Ekman's theory, p. 892-895 (*See 12.1-352, Jan. 1961*)
Ozmidov, R. V.: On the dependence of the coefficient of horizontal turbulent diffusion in wind currents upon the relative depth of a water basin, p. 896-899
Kuznetsov, A. M. and Kuznetsov, V. A.: On the properties and nature of spherical sea-pebbles, p. 900-902
Karus, E. V.: Seismological research at some geophysical institutions in the U. S. A., p. 903-909

- Bukhnikashvili, A. V.: Scientific session on the occasion of the 25th anniversary of the Geophysical Institute, Academy of Sciences of the Georgian S.S.R., p. 906-908
- Abakelia, M. S.: On some methodological problems encountered during geophysical prospecting for the Poladaura iron ore deposit in the Georgian S.S.R., p. 908-910
- Kirillov, F. A.: Fourth Conference of Young Specialists of the O.I.u. Schmidt Institute of Physics of the Earth of the Academy of Sciences of the U.S.S.R., p. 910-912

Akademiia Nauk SSSR. Komissiiia po Issledovaniuu Solntsa, Physics of solar corpuscular streams and their influence on the upper atmosphere of the earth. (Selected articles from its *Fizika solnechnykh korpuskuliarnykh potokov i ikh vozdeistvie na verkh-niuiu atmosferu Zemli*, issued 1957. Transl. by John Miller and Judith Danner, issued by American Meteorological Society under Contract AF 19(604)-1936, as its Translation T-RC-13+, 1959) (For abstract on this monograph, see 10.6-3, June 1959, *Met. Abstracts*)

- Mustel', E. R.: Discussion of the possible sources of geoactive corpuscles in the solar envelope p. 1-56 (For abstract on the original Russian, see 12.1-115, Jan. 1961)
- Severnyi, A. B.: Spectroscopic investigation of corpuscular ejections on the sun, p. 57-72 (See 10.10-257, Oct. 1959)
- Ponomarev, E. A.: Solar corpuscular radiation and the topology of the magnetic field in the solar corona, p. 73-80 (See 10.10-256, Oct. 1959)
- Nikol'skii, A. P.: Magnetic disturbances in the region near the Pole and the existence of a second zone of their increased intensity, p. 94-111
- Ol', A. I.: The connection between solar activity and geomagnetic disturbances, p. 112-120
- Isaev, S. I.: Hydrogen radiation in the spectrum of polar aurorae, p. 126-129 (See 11.1-316, Jan. 1960)
- Mogilevskii, E. I.: The equation of quasistationary ionization equilibrium in the F2 region and solar corpuscular radiation, p. 130-138 (See 11D-103, April 1960)

Soviet Research in Geophysics, Vol. 1, 1960. (A collection of articles on dynamic meteorology, ed. by I. A. Kibel), issued for American Geophysical Union by Consultants Bureau, N. Y. (Transl. of the original Russian, *Sbornik Statei po Dinamicheskoi Meteorologii*, issued as *Akademiia Nauk SSSR. Geofizicheskii Institut, Trudy*, No. 37(164), 1956)

- Gutman, L. N.: A theory for soil temperature calculation, p. 1-57
- Sarkisian, A. S.: On the determination of the steady wind current in a baroclinic ocean layer, p. 58-72 (See 10.10-80, Oct. 1959, *Met. Abstracts*)
- Feigel'son, E. M.: The influence of clouds on the atmospheric heat balance, p. 73-104 (See 11.9-307, Sept. 1960)
- Malkevich, M. S.: Atmospheric cooling by radiational heat exchange, p. 105-119 (See 10.3-247, Mar. 1959)
- Malkevich, M. S.: The temporal change of air temperature by turbulent mixing and radiational heat exchange, p. 120-140 (See 10.2-227, Feb. 1959)
- Malkevich, M. S.: Theoretical consideration of the solar radiation absorbed by the atmosphere for different time intervals, p. 141-154 (See 10.9-214, Sept. 1959)
- Kogan, S. Ia.: On a method of calculating the advective heat influx, p. 155-181 (See 9.11-182, Nov. 1958)

Vol. 2, 1960 (Transl. of Trudy, No. 38(165), 1957)

Liustikh, E. N.: Isostasy and isostatic hypotheses. 119 p.

Vol. 3, 1960 (Transl. of Trudy, No. 39(166), 1958)

Ivakin, B. N.: Microstructure and macrostructure of elastic waves in one-dimensional continuous nonhomogeneous media. 113 p.

Vol. 4, 1960 (Transl. of Trudy No. 40(166, i.e. 167), 1957)

Bessonova, E. N.; Gotsadze, O. D.; Keilis-Borok, V. I. et al.: Investigation of the mechanism of earthquakes. 201 p.

B. ARTICLES APPEARING IN RECENTLY ISSUED PUBLICATIONS

Akademii Nauk SSSR, Izvestiia, Ser. Geog., No. 5, May 1960

- Avsiuk, G. A.: **Gliatsiologicheskie issledovaniia v period Mezhdunarodnogo Geofizicheskogo Goda, 1957-1958-1959 gg.**, [Glaciological research under the program of the IGY, 1957-1959], p. 11-21
- Gordienko, P. A. and Laktionov, A. F.: **Glavnye rezul'taty noveishikh okeanograficheskikh issledovaniĭ v Arkticheskom basseine**, [Main results of recent oceanographical explorations in the Arctic Basin], p. 22-33
- Pavlov, A. V. and Rauner, Iu. L.: **Nekotorye rezul'taty nabludenii za sostavliaiushchimi teplovogo balansa snezhnogo pokrova**, [Results of investigation into thermal balance components in snow cover], p. 53-59
- Lebedeva, I. M. and Minaeva, E. N.: **Issledovanie proniknoveniia solnechnoi radiatsii v snezhnyi pokrov v sviazi s parnikovym efektom pri snegotaianii**, [Study of the penetration of solar radiation into snow cover in connection with hothouse effect during snow melt], p. 60-64
- Rantsman, E. Ia.: **Nekotorye voprosy geomorfologii Garmского raiona Tadzhikistana v sviazi ego seismichnost'iu**, [Geomorphological problems of the Garm district, Tadzhikistan, with reference to its seismic activity], p. 82-87
- Chalysheva, N. I.: **O pokazatele vodnykh mass**, [Water mass index], p. 119-123

Akademii Nauk SSSR. Morskoĭ Gidrofizicheskii Institut, Trudy, Vol. 15, 1959

- Sekerzh-Zhen'kovich, Ia. I.: **O zadache Koshi-Puassona dlia zhidkoi sfery i dlia sloia zhidkosti, pokryvaiushchego tverdyĭ shar**, [The Cochi-Poisson problem for a liquid sphere and for a layer of liquid covering a solid globe], p. 3-16
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- Voit, S. S.: **Perekhod ploskikh voln cherez melkovodnuiu zonu**, [Passage of flat waves through a shallow water region], p. 34-42
- Zubkova, I. D.: **Skhema dreifovykh techenii v pribrezhnoi zone nad pologim naklonnym dnom v zavisimosti ot napravleniia i skorosti vetra**, [Drift current system in a coastal area over a sloping bottom depending on wind speed and direction], p. 43-55
- Korneva, L. A. and Mashkov, S. T.: **Avtomaticheskii schetchik periodov morskikh voln i ego ispytanie**, [Automatic sea wave period counter and its testing], p. 56-64
- Korneva, L. A.: **Chastotnye spektry periodov morskikh voln (Rezul'taty registratsii periodov voln u dna)**, [Time spectra of sea wave periods (results of wave period recordings at the bottom)], p. 65-79
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- Ivanov, A. A.: **O volneniakh na Azovskom more i Tsimlianskom vodokhranilishche**, [Wave activity in the Sea of Azov and the Tsimliansk reservoir], p. 91-96
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American Geophysical Union, Transactions, Vol. 41, No. 2, June 1960 (includes Twelfth General Assembly of the International Union of Geodesy and Geophysics: United States National Report, 1957-1960, p. 131-318

- Ewing, Maurice: [Biographical sketch of] Francis Birch: twenty-second award of the William Bowie Medal, p. 123

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